NATIONAL MARINE FISHERIES SERVICE
ENDANGERED SPECIES ACT SECTION 7 CONSULTATION
BIOLOGICAL OPINION

Agency: US Army Corps of Engineers, New England District
Concord, Massachusetts

Activity: Biological sampling and monitoring program to assess suitability of NOMES I site as potential borrow site for nourishment of Winthrop Beach (Tracking number: F/NER/2003/01216)

Conducted by: National Marine Fisheries Service
Northeast Regional Office

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Approved by: Patricia A. Kurkul

This constitutes the National Marine Fisheries Service's (NOAA Fisheries) biological opinion (BO) on the effects of the US Army Corps of Engineers' (ACOE) issuance of a permit to the Massachusetts Division of Urban Parks & Recreation (formerly the Metropolitan District Commission) for biological sampling and monitoring activities at the NOMES I site, a proposed borrow area for nourishment of Winthrop Beach in Winthrop, MA on threatened and endangered species in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.). This BO is based on information provided in the Winthrop Shores Reservation Restoration Program Endangered Species Biological Assessment (BA), correspondence with the ACOE, and other sources of information. A complete administrative record of this consultation will be kept at the NOAA Fisheries Northeast Regional Office. Formal consultation was initiated on August 25, 2003.

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1.0 CONSULTATION HISTORY

The Winthrop Shore Reservation Restoration Program is part of the Back to the Beaches (BTB) program to restore the urban beaches of Boston Harbor. During the early design phases of the restoration plans, it was determined that Winthrop Beach requires storm damage protection in the form of beach nourishment. The Massachusetts Division of Urban Parks and Recreation (DUPR) entered into meetings with a Pre-application Review Committee (PRC) to discuss the borrow site alternatives and determine which would be the Least Environmentally Damaging Practicable Alternative (LEDPA). Three potential borrow sources were proposed for the beach nourishment, and a Draft Environmental Impact Report (DEIR) on the Winthrop Shores improvements, including the dredging and subsequent nourishment of Winthrop Beach, was prepared in December 2002. Massachusetts state regulatory agencies, as well as NOAA Fisheries, expressed concern with the DUPR's preferred alternative, the NOMES I offshore borrow site. Accordingly, the Massachusetts Secretary of Environmental Affairs' Certificate on the DEIR called for additional analysis of the marine resources and geophysical conditions at NOMES I to properly assess the effects of dredging at the site.

During subsequent meetings on the proposed biological sampling protocol, it became clear that the study could potentially affect endangered and threatened species in the NOMES I site. As such, the ACOE decided to issue a permit for the sampling and monitoring activities separately from the permit that would be issued for the actual dredging activity. In a letter dated May 5, 2003, the ACOE requested initiation of consultation on the biological sampling and monitoring activities at the NOMES I borrow site. In a letter dated June 10, 2003, NOAA Fisheries confirmed that formal consultation on this action would be necessary and requested the submission of a Biological Assessment (BA), which NOAA Fisheries received on August 25, 2003. In a letter dated September 24, 2003, NOAA Fisheries confirmed August 25, 2003 as the date of initiation of consultation.

2.0 DESCRIPTION OF THE PROPOSED ACTION

The proposed sampling and monitoring activities are required as part of a 12-month fishery resource investigation that will help characterize the resources that could potentially be impacted by removal of sand and gravel from the NOMES I borrow site for nourishment of Winthrop Beach. The 103-acre NOMES I borrow site is located approximately 8 miles east of Winthrop, MA. Water depth at the site is approximately 80-90 feet. The sampling and monitoring protocol includes a variety of bathymetric, benthic, epifauna, shellfish, finfish, and video surveys; however, the finfish survey is the only portion of the protocol that may affect listed species, and is the only portion of the project that will be addressed in this biological opinion (BO). The finfish surveys will entail the use of bottom trawl gear and possibly gillnet gear if bottom characteristics at the NOMES I site preclude the use of the bottom trawl.

The bottom trawl surveys associated with this project will consist of five, ten-minute tows each in the NOMES I site and a reference area which is adjacent to and slightly southeast of the NOMES I site (see Appendix B). The trawl will be approximately 45-feet wide with a 3 to 5-

foot high mouth opening, and will travel at a speed of 2.5 knots. Studies will take place two to three times per month, year-round. Samples will be retained for stomach analysis. Fishing activity and the presence of fishing gear at the NOMES I site will also be recorded. Proper resuscitation techniques would be used if a sea turtle were to be captured in the net and appropriate personnel at the New England Aquarium or the Massachusetts Audubon Society would be notified.

Gillnet sampling is also included in the protocol as an optional alternative in the event that bottom trawling is not possible in some portions of the NOMES I site due to bottom obstructions or snags. If necessary, gillnetting will take place once monthly between October and February only. Three monofilament nets would be set in the NOMES I site, and three nets would be set in reference sites. The gillnets would be 200 feet long and 8 feet deep constructed of five equal length panels of different mesh sizes, ranging from 0.75 inch to 2.5 inches. They would be sinking, anchored nets with the bottom line resting on or near the bottom and the float line rising 8 feet above the bottom. Each end of the net would be marked with a surface float. Nets would only be set during daylight hours, and set duration would not exceed six hours, throughout which time the sampling vessel would remain on site. An observer would be present onboard the vessel to spot any endangered species in the area, and if a marine mammal or sea turtle was present, gillnets would not be set and any nets already set would be immediately hauled.

In addition to the above, NOAA Fisheries and the applicant discussed the following mitigation measures, which were incorporated into the sampling and monitoring plan and will be considered in the effects analysis:

1) When gillnetting, the ACOE and/or DUPR will comply with all applicable Atlantic Large Whale Take Reduction Plan measures (see Appendix I).

2) If gillnetting will be conducted, the ACOE and/or DUPR will consult the Sighting Advisory System web page at http://whale.wheelock.edu/whalenet-stuff/reportsRW_NE/ or by tuning into NOAA weather radio to obtain the most recent information about right whale sightings in the vicinity of the sampling site. If a right whale has been sighted and the buffer zone overlaps the NOMES I site, gillnetting will be delayed at least one week from the date of the reported sighting.

3) During transit to and from the NOMES site, vessel speed will be limited to ten knots or less. When NOAA Fisheries-approved observers are not present, a dedicated bridge watch must be posted during transit to and from the sampling site. If whales are spotted, the vessel must slow to five knots or less and avoid approaching the whale within 500 yards.

Action Area
The action area for this consultation includes the NOMES I borrow site and surrounding waters in the Massachusetts Bay. The 103-acre borrow site is centered at 42° 22' N, 70° 47' W, approximately 8 miles offshore of Winthrop Beach in Winthrop, MA.

3.0 STATUS OF AFFECTED SPECIES

NOAA Fisheries has determined that the action being considered in this biological opinion may affect the following endangered or threatened species under NOAA Fisheries' jurisdiction:

Cetaceans	
Right whale (*Eubalaena glacialis*)	Endangered
Humpback whale (*Megaptera novaeangliae*)	Endangered
Fin whale (*Balaenoptera physalus*)	Endangered
Sea Turtles	
Loggerhead sea turtle (*Caretta caretta*)	Threatened
Leatherback sea turtle (*Dermochelys coriacea*)	Endangered
Kemp's ridley sea turtle (*Lepidochelys kempii*)	Endangered
Green sea turtle (*Chelonia mydas*[1])	Endangered/Threatened
Hawksbill sea turtle (*Eretmochelys imbricata*)	Endangered

In Massachusetts, the federally endangered shortnose sturgeon (*Acipenser brevirostrum*) is only known to occur in the Merrimack and Connecticut Rivers, neither of which are in the vicinity of the NOMES I site (NOAA Fisheries 1998b). As such, shortnose sturgeon are not likely to be present in the action area and will not be considered further in this biological opinion.

This section will focus on the status of the various species within the action area, summarizing information necessary to establish the environmental baseline and to assess the effects of the proposed action. Background information on the range-wide status of these species and a description of critical habitat can be found in a number of published documents, including recent sea turtle status reviews and stock assessments (NOAA Fisheries and USFWS 1995, USFWS 1997, TEWG 2000, NOAA Fisheries SEFSC 2001), Recovery Plans for the humpback whale (NOAA Fisheries 1991a), right whale (NOAA Fisheries 1991b), and fin whale (NOAA Fisheries 1998a), loggerhead sea turtle (NOAA Fisheries and USFWS 1991b), leatherback sea turtle (NOAA Fisheries and USFWS 1992), green sea turtle (NOAA Fisheries and USFWS 1991a) and the marine mammal stock assessment reports (Waring et al. 1999, 2000, 2001, and 2002).

3.1 North Atlantic Right Whale

While NOAA Fisheries recognizes three major subgroups of right whales, the North Atlantic subpopulation of right whales occurs in the action area. New England waters include important foraging habitat for right whales. At least some right whales are present in these waters throughout most months of the year, with concentrations observed in the Cape Cod Bay and Great South Channel critical habitat areas, which were designated by NOAA Fisheries on June 3,

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[1] Pursuant to NOAA Fisheries regulations at 50 CFR 223.205, the prohibitions of Section 9 of the Endangered Species Act apply to all green turtles, whether endangered or threatened.

1994 (59 FR 28793). Right whales are most abundant in Cape Cod Bay between February and April (Hamilton and Mayo 1990; Schevill et al. 1986; Watkins and Schevill 1982) and in the Great South Channel in May and June (Kenney et al. 1986; Payne et al. 1990) where they have been observed feeding predominantly on copepods, largely of the genera *Calanus* and *Pseudocalanus* (Waring et al. 1999). Right whales also frequent Stellwagen Bank and Jeffrey's Ledge, as well as Canadian waters including the Bay of Fundy and Browns and Baccaro Banks, in the spring and summer months. Research suggests that right whales must locate and exploit extremely dense patches of zooplankton to feed efficiently (Mayo and Marx 1990). These dense zooplankton patches are thus likely a primary characteristic of the spring, summer, and fall right whale habitats (Kenney et al. 1986, 1995). The characteristics of acceptable prey distribution in these areas are not well known. (Waring et al. 2002)

While it is not possible to obtain an exact count of the number of western North Atlantic right whales, IWC participants from a 1999 workshop agreed that it is reasonable to state that the current number of western North Atlantic right whales is probably around 300 (+/- 10%) (IWC 2001). This conclusion was based, in large part, on a photo-id catalog comprising more than 14,000 photographed sightings of 396 individuals, 11 of which were known to be dead and 87 of which had not been seen in more than 6 years. In addition, it was noted that relatively few new non-calf whales (whales that were never sighted and counted in the population as calves) had been sighted in recent years (IWC 2001) suggesting that the 396 individuals is a close approximation of the entire population. Since the 1999 IWC workshop there have been at least 53 right whale births, one in 2000, 31 in 2001, and 21 in 2002 (data are not yet available for the 2003 season). In addition, one animal was "resurrected," meaning that it was seen after an absence of at least 6 years. However, at least four of the calves are known to be dead and a fifth was not re-sighted with its mother on the summer foraging grounds. Three adult right whales are known to have died and two are suspected of having died since the 1999 IWC workshop. Although the "count" of right whales is 342 animals based on the original count of 396 individually identified whales, the number of observed right whale births and the known and presumed mortalities, for the purposes of this BO, NOAA Fisheries considers the best approximation for the number of North Atlantic right whales to be approximately 300 +/- 10% given that all mortalities are not known.

Sighting data and genetics data also support the conclusion that, as found previously, calving intervals have increased (from 3.67 years in 1992 to 5.8 years in 1998) and the survival rate has declined (IWC 2001). Even more alarming, the mortality of mature, reproductive females has increased, causing declines in population growth rate, life expectancy, and the mean lifetime number of reproductive events between the period 1980-1995 (Fujiwara and Caswell 2001). In addition, for reasons which are unknown, many (presumed) mature females are not yet known to have given birth (an estimated 70% of mature females are reproductively active). Simply put, the western North Atlantic right whale population is declining because the trend over the last several years has been a decline in births coupled with an increase in mortality.

Factors that have been suggested as affecting right whale reproductive success and mortality include reduced genetic diversity, pollutants, and nutritional stress. However, there is no evidence available to determine their potential effect, if any, on western North Atlantic right whales. The size of the western North Atlantic subpopulation of right whales at the termination of whaling is unknown, but is generally believed to have been very small. Such an event may have resulted in a loss of genetic diversity which could affect the ability of the current population to successfully reproduce (*i.e.*, decreased conceptions, increased abortions, and increased neonate mortality). Studies by Schaeff *et al.* (1997) and Malik *et al.* (2000) indicate that western North Atlantic right whales are less genetically diverse than southern right whales. However, several apparently healthy populations of cetaceans, such as sperm whales and pilot whales, have even lower genetic diversity than observed for western North Atlantic right whales (IWC 2001). Similarly, while contaminant studies have confirmed that right whales are exposed to and accumulate contaminants, researchers could not conclude that these contaminant loads were negatively affecting right whales since concentrations were lower than those found in marine mammals proven to be affected by PCB's and DDT (Weisbrod *et al.* 2000). Finally, although North Atlantic right whales appear to have thinner blubber than right whales from the South Atlantic (Kenney 2000), there is no evidence at present to demonstrate that the decline in birth rate and increase in calving interval is related to a food shortage. These concerns were also discussed at the 1999 IWC workshop, where it was pointed out that since *Calanus* sp. are the most common zooplankton in the North Atlantic and current right whale abundance is greatly below historical levels, the proposal that food limitation was the major factor seemed questionable (IWC 2001).

Anthropogenic impacts

The major known sources of anthropogenic mortality and injury of right whales include entanglement in commercial fishing gear and ship strikes. Right whales may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to trophic effects resulting from a variety of activities.

Anthropogenic mortality in the form of ship strikes and fishing gear entanglements does appear to be affecting the status of western North Atlantic right whales. Data collected from 1970 through 1999 indicate that anthropogenic interactions are responsible for a minimum of two-thirds of the confirmed and possible mortality of non-neonate animals (Knowlton and Kraus 2001). Of the 45 right whale mortalities documented during this period, 16 were due to ship collisions and three were due to entanglement in fishing gear (there were also 13 neonate deaths and 13 deaths of non-calf animals from unknown causes) (Knowlton and Kraus 2001). Based on the criteria developed by Knowlton and Kraus (2001), 56 additional serious injuries and mortalities from entanglement or ship strikes are believed to have occurred between 1970 and 1999: 9 from ship strikes and 28 from entanglement. Nineteen were considered to be fatal interactions (16 ship strikes, 3 entanglements). Ten were possibly fatal (2 ship strikes, 8 entanglements), and 27 were non-fatal (7 ship strikes, 20 entanglements) (Knowlton and Kraus 2001). Scarification analysis also provides information on the number of right whales that have survived ship strikes and fishing gear entanglements. Based on photographs of catalogued animals from 1959 and 1989, Kraus (1990) estimated that 57 percent of right whales exhibited scars from entanglement and 7 percent from ship strikes (propeller injuries). This work was updated by Hamilton *et al.* (1998) using data from 1935 through 1995. The new study estimated that 61.6 percent of right whales exhibit injuries caused by entanglement, and 6.4 percent exhibit signs of injury from vessel strikes. In addition, several whales have apparently been entangled on more than one occasion. Some right whales that have been entangled were subsequently involved in ship strikes. Because some animals may drown or be killed immediately, the actual number of interactions is expected to be higher.

During 2002 there were six right whale mortalities and eight known entanglements. One of the mortalities was a known entangled whale. Of the remaining seven entangled whales, one has been observed free of gear, two more appeared to be free of gear (although this could not be confirmed), three remained seriously entangled and appeared to be in various states of poor health when last seen during the 2003 observer season, and one has not been re-sighted. This number of entanglements/deaths is of great concern given the critical status of the North Atlantic right whale population. The number of whales that remain entangled in 2003 also demonstrates the complexity of resolving the entanglement problem. For example, many of the whales are entangled in line of unknown origin making it difficult to determine what activities are contributing to entanglement of right whales. In addition, it is often difficult to determine where interactions occur. For example, five of the whales were first observed entangled in Canadian waters despite substantial survey effort in U.S. waters in the Southeast and Northeast during the winter and spring/early summer months. Although previous BOs have taken a conservative approach and assumed all right whale entanglements occurred in U.S. waters unless there was conclusive evidence to suggest otherwise, some entanglements may be occurring in Canadian waters and are being erroneously attributed to U.S. activities.

In 2003, three new confirmed entanglements and one unconfirmed entanglement were observed. Right whale entanglements continue to be closely monitored to evaluate the effectiveness of the large whale take reduction measures presently in place to reduce the severity and number of right whale entanglements in gillnet gear (and pot/trap gear).

Based on recent reviews of the status of the right whales, their reproductive rate (the number of calves that are born in the population each year) appears to be declining, which could increase the whales' risk of extinction (Caswell *et al.* 1999, Fujiwara and Caswell 2001, IWC 2001). The best available population estimate and the best available data on right whale population trends suggests that the western North Atlantic subpopulation of right whales is declining. This conclusion is based on a combination of a low estimated population size, increased mortality rate (particularly among adult females), and decreased reproductive rate.

3.2 Humpback Whale

Humpback whales calve and mate in the West Indies and migrate to six separate feeding areas in the northwestern Atlantic during the summer months (Waring et al. 2002). These six regions represent relatively discrete subpopulations, fidelity to which is determined matrilineally (Clapham and Mayo 1987 in Waring et al. 2002). The Gulf of Maine stock was reclassified as a separate feeding stock for management purposes based on strong fidelity by individual whales to this region, and the attendant assumption that repopulation by immigration from adjacent areas would not occur on a reasonable management timescale if the subpopulation were wiped out. Recent genetic analyses have found significant differences in mtDNA haplotype frequencies of the four western feeding areas, including the Gulf of Maine, further supporting this reclassification. (Waring et al. 2002)

Most of the humpbacks that forage in the Gulf of Maine visit Stellwagen Bank and the waters of Massachusetts and Cape Cod Bays. Sightings are most frequent from mid-March through November between 41°N and 43°N, from the Great South Channel north along the outside of Cape Cod to Stellwagen Bank and Jeffrey's Ledge (CeTAP 1982), and peak in May and August. Small numbers of individuals may be present in this area year-round, including the waters of Stellwagen Bank. They feed on a number of species of small schooling fishes, particularly sand lance and Atlantic herring, by targeting fish schools and filtering large amounts of water for the associated prey. Humpback whales have also been observed feeding on krill (Wynne and Schwartz 1999). Since feeding is the primary activity of humpback whales in New England waters, their distribution is correlated to prey species and abundance. For example, humpback whales were few in nearshore Massachusetts waters in the 1992-93 summer seasons, but when sand lance became more abundant in the Stellwagen Bank area in 1996 and 1997, humpback abundance also increased (Waring et al. 2002).

Estimating the abundance of the Gulf of Maine stock has proved problematic. Three different approaches were investigated: mark-recapture estimates, minimum population size, and line-transect estimates. The line-transect estimate is considered the best estimate of abundance for Gulf of Maine humpback whales. The line-transect sighting survey took place between 28 July to 31 August 1999 and covered waters from Georges Bank to the mouth of the Gulf of St. Lawrence. The portions of the survey that covered Gulf of Maine waters were combined with 25% of the Scotian Shelf survey area (to reflect the match rate of 25% between the Scotian Shelf and the Gulf of Maine populations), yielding an estimate of 902 whales (CV=0.41, Waring et al. 2002).

Photographic mark-recapture analyses from the Years of the North Atlantic Humpback (YONAH) project gave an ocean-basin-wide estimate of 11,570 for 1992/93 (CV=0.069, Stevick et al. 2001 in Waring et al. 2002). For management purposes under the MMPA, the estimate of 11,570 is regarded as the best available estimate for the North Atlantic population, although because YONAH sampling was not spatially representative in feeding grounds, this figure is negatively biased (Waring *et al.* 2002). Current data suggest that the Gulf of Maine humpback whale stock is steadily increasing in size. This is consistent with an estimated average trend of 3.2% (SE=0.005) growth in the North Atlantic population overall for the period 1979–1993 (Stevick *et al.* 2001 in Waring *et al.* 2002). A recent analysis of demographic parameters for the Gulf of Maine stock (Clapham *et al.* 2001a in Waring *et al.* 2002) suggested a lower rate of increase than the 6.5% reported by Barlow and Clapham (1997), but results may have been confounded by distribution shifts. With respect to the species overall, there are also indications of increasing abundance for the eastern and central North Pacific stocks. However, trend and abundance data are lacking for the western North Pacific stock, the Southern Hemisphere humpback whales, and the Southern Indian Ocean humpbacks. Given the best available information, changes in status of the North Atlantic humpback population are, therefore, likely to affect the overall survival and recovery of the species.

Anthropogenic impacts

Between 1996-2000, the total estimated human-caused mortality and serious injury to the Gulf of Maine humpback whale stock was 3.0 per year (Waring et al. 2002). An additional minimum annual average of 1.6 human-caused mortalities in the southeastern and mid-Atlantic states could not be confirmed as involving members of the Gulf of Maine stock. The major known sources of anthropogenic mortality and injury of humpback whales include entanglement in commercial fishing gear and ship strikes. Sixty percent of mid-Atlantic humpback whale mortalities that were closely investigated showed signs of entanglement or vessel collision (Wiley *et al.* 1995). An updated analysis of humpback whale mortalities from the mid-Atlantic region indicates that between 1990 and 2000, there were 52 known humpback whale mortalities in the waters of the U.S. mid-Atlantic states (Barco *et al.* 2001 in Waring et al. 2002). Between 1992 and 2002, at least 103 humpback whale entanglements and 10 ship strikes (this includes an interaction between a humpback whale and a 33' pleasure boat) were recorded. There were also many carcasses that washed ashore or were spotted floating at sea for which the cause of death could not be determined. The disentanglement program helps to alleviate some of the effects of gear entanglements but cannot remove the risk of injury and death for entangled whales. For example, of the 11 humpback whales observed entangled in 2002, six were disentangled and one was able to shed its gear. However, one of the disentangled animals was found dead just days later. In 2003, there were 21 observed humpback entanglements (although two of these reports may have been the same whale). Of these, nine were successfully disentangled, one was partially disentangled, one was able to shed its gear, and the fates of the remaining ten are currently unknown.

Based on photographs of the caudal peduncle of humpback whales, Robbins and Mattila (1999) estimated that at least 48 percent—and possibly as many as 78 percent—of animals in the Gulf of Maine exhibit scarring caused by entanglement. These estimates are based on sightings of free-swimming animals that initially survived the encounter. Because some whales may drown immediately, the actual number of interactions may be higher. In their study of entanglement rates estimated from caudal peduncle scars, Robbins and Mattila (2001) found that males were more likely to be entangled than females. The scarring data also suggested that yearlings were more likely than other age classes to be involved in entanglements. Finally, female humpbacks showing evidence of prior entanglements produced significantly fewer calves, suggesting that entanglement may significantly impact reproductive success.

Humpback whales may also be adversely affected by habitat degradation, habitat exclusion, acoustic trauma, harassment, or reduction in prey resources due to trophic effects resulting from a variety of activities, including the operation of commercial fisheries.

3.3 Fin Whale

The fin whale is ubiquitous in the North Atlantic and occurs from the Gulf of Mexico and Mediterranean Sea northward to the edges of the arctic ice pack (NOAA Fisheries 1998a). During 1978-1982 aerial surveys, fin whales accounted for 24% of all cetaceans and 46% of all large cetaceans sighted over the continental shelf between Cape Hatteras and Nova Scotia (Waring *et al.* 2002). Underwater listening systems have also demonstrated that the fin whale is the most acoustically common whale species heard in the North Atlantic (Clark 1995). Fin whales may be found throughout Northeast waters in most months of the year. The single most important area for this species appears to be from the Great South Channel, along the 50m isobath past Cape Cod, over Stellwagen Bank, and past Cape Ann to Jeffreys Ledge (Hain *et al.*1992).

Like right and humpback whales, fin whales are believed to use North Atlantic waters primarily for feeding, and more southern waters for calving. However, evidence regarding where the majority of fin whales winter, calve, and mate is still scarce. Clark (1995) reported a general pattern of fin whale movements in the fall from the Labrador/Newfoundland region, south past Bermuda and into the West Indies, but neonate strandings along the U.S. Mid-Atlantic coast from October through January suggest the possibility of an offshore calving area (Hain *et al.* 1992). The overall distribution may be based on prey availability, and the fin whale preys opportunistically on both invertebrates and fish (Watkins et al. 1984). New England waters represent a major feeding ground for the fin whale (Waring et al. 2002). Seipt et al. (1990) reported that 49% of identified fin whales on Massachusetts Bay area feeding grounds were resighted within the same year, and 45% were resighted in multiple years. These authors suggested that fin whales on these grounds exhibited patterns of seasonal occurrence and annual return that are in some respects similar to those shown for humpback whales. This was reinforced by Clapham and Seipt (1991), who showed maternally directed site fidelity by fin whales in the Gulf of Maine. Similar to humpback whales, fin whales feed by filtering large volumes of water for the associated prey. Fin whales are larger and faster than humpback and right whales and are less concentrated in nearshore environments.

Various estimates have been provided to describe the current status of fin whales in western North Atlantic waters. One method used the catch history and trends in Catch Per Unit Effort to obtain an estimate of 3,590 to 6,300 fin whales for the entire western North Atlantic (Perry *et al.* 1999). Hain *et al.* (1992) estimated that about 5,000 fin whales inhabit the Northeastern United States continental shelf waters. The 2002 Stock Assessment Report (SAR) gives a best estimate of abundance for fin whales of 2,814 (CV = 0.21). The minimum population estimate for the western North Atlantic fin whale is 2,362 (Waring *et al.* 2002). However, this is considered an underestimate since the estimate derives from surveys over a limited portion of the western North Atlantic.

Anthropogenic impacts
The major known sources of anthropogenic mortality and injury of fin whales include entanglement in commercial fishing gear and ship strikes. The fin whale is believed to be the cetacean most commonly struck by large vessels (Laist *et al.* 2001). Of 18 fin whale mortality records collected between 1991 and 1995, four were associated with vessel interactions, although the proximal cause of mortality was not known. From 1996-July 2001, there were nine observed fin whale entanglements and at least four ship strikes. There were no documented fin whale entanglements in 2002, and there was one reported fin whale entanglement in 2003. In addition, hunting of fin whales continued well into the 20th century. Fin whales were given total protection in the North Atlantic in 1987 with the exception of a subsistence hunt in Greenland (Gambell 1993, Caulfield 1993). However, Iceland reported a catch of 136 whales in the 1988/89 and

1989/90 seasons, and has since ceased reporting fin whale kills to the IWC (Perry *et al.* 1999). In total, there have been 239 reported kills of fin whales from the North Atlantic from 1988 to 1995.

3.4 Loggerhead Sea Turtle

Loggerhead sea turtles occur throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans in a wide range of habitats. These include open ocean, continental shelves, bays, lagoons, and estuaries (NOAA Fisheries and USFWS 1995). The loggerhead is the most abundant species of sea turtle in U.S. waters, commonly occurring throughout the inner continental shelf from Florida through Cape Cod, Massachusetts. NOAA Fisheries Northeast Fisheries Science Center (NEFSC) survey data (1999) has found that loggerheads may occur as far north as Nova Scotia when oceanographic and prey conditions are favorable. The loggerhead sea turtle was listed as threatened under the ESA on July 28, 1978, but is considered endangered by the World Conservation Union (IUCN).

Loggerhead sea turtles are generally grouped by their nesting locations. Nesting is concentrated in the north and south temperate zones and subtropics. Loggerheads generally avoid nesting in tropical areas of Central America, northern South America, and the Old World (Magnuson et al. 1990). The largest known nesting aggregations of loggerhead sea turtles occurs on Masirah and Kuria Muria Islands in Oman (Ross and Barwani 1982). However, the status of the Oman nesting beaches has not been evaluated recently, and their location in a part of the world that is vulnerable to extremely disruptive events (e.g. political upheavals, wars, and catastrophic oil spills) is cause for considerable concern (Meylan et al. 1995). The southeastern U.S. nesting aggregation is the second largest and represents about 35 percent of the nests of this species. From a global perspective, this U.S. nesting aggregation is, therefore, critical to the survival of this species.

In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the gulf coast of Florida. In 1996, the Turtle Expert Working Group (TEWG) met on several occasions and produced a report assessing the status of the loggerhead sea turtle population in the western North Atlantic. Based on analysis of mitochondrial DNA, which the turtle inherits from its mother, the TEWG theorized that nesting assemblages represent distinct genetic entities, and that there are at least four loggerhead subpopulations in the western North Atlantic separated at the nesting beach (TEWG 1998, 2000). A fifth subpopulation was identified in a 2001 stock assessment of loggerhead and leatherback turtles (NOAA Fisheries SEFSC 2001). The subpopulations are divided geographically as follows: (1) a northern nesting subpopulation, occurring from North Carolina to northeast Florida, about 29° N (approximately 7,500 nests in 1998); (2) a south Florida nesting subpopulation, occurring from 29° N on the east coast to Sarasota on the west coast (approximately 83,400 nests in 1998); (3) a Florida panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida (approximately 1,200 nests in 1998); (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez 1990; approximately 1,000 nests in 1998); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (approximately 200 nests per year). Natal homing to the nesting beach is believed to provide the genetic barrier between these nesting aggregations, preventing recolonization by turtles from other nesting beaches. In addition, recent fine-scale analysis of mtDNA work from Florida rookeries indicate that population separations begin to appear between nesting beaches separated by more than 50-100 km of coastline that does not host nesting (Francisco et al. 1999). Tagging studies are consistent with this result (Richardson 1982, Ehrhart 1979, LeBuff 1990, CMTTP: in NOAA Fisheries SEFSC 2001). Nest site relocations greater than 100 km occur, but are rare (Ehrhart 1979; LeBuff 1974, 1990; CMTTP; Bjorndal et al. 1983 in NOAA Fisheries SEFSC 2001).

Although NOAA Fisheries has not formally recognized subpopulations of loggerhead sea turtles under the ESA, based on the most recent reviews of the best scientific and commercial data on the population genetics of loggerhead sea turtles and analyses of their population trends (TEWG, 1998; TEWG 2000), NOAA Fisheries treats the loggerhead turtle nesting aggregations as nesting subpopulations whose survival and recovery are critical to the survival and recovery of the species. Any action that appreciably reduced the likelihood that one or more of these nesting aggregations would survive and recover would appreciably reduce the species' likelihood of survival and recovery in the wild. Consequently, this biological opinion will treat the five nesting aggregations of loggerhead sea turtles (which occur in the action area) as subpopulations for the purposes of this analysis.

The loggerhead sea turtles in the action area of this consultation likely represent turtles that have hatched from any of the five western Atlantic nesting sites, but are probably composed primarily of turtles that hatched from the northern nesting group and the south Florida nesting group. Although genetic studies of benthic immature loggerheads on the foraging grounds have shown the foraging areas to be comprised of a mix of individuals from different nesting areas, there appears to be a preponderance of individuals from a particular nesting area in some foraging locations. In general, south Florida turtles are more prevalent on southern foraging grounds and their concentrations decline to the north. Conversely, loggerhead turtles from the northern nesting group are more prevalent on northern foraging grounds and less so in southern foraging areas (Table 1; NOAA Fisheries SEFSC 2001; Bass et al. 1998).

Table 1. Contribution of loggerhead subpopulations to foraging grounds

	% CONTRIBUTION TO FORAGING GROUND				
SUBPOPULATION[a]	Western Gulf	Florida	Georgia	Carolinas	North of Cape Hatteras/Virginia[b]
South Florida	83%	73%	73%	65-66%	46%
Northern	10%	20%	24%	25-28%	46%
Yucatán	6-9%	6-9%	3%	6-9%	6-9%

[a] The Florida Panhandle population was not included because it contributes less than 1% in the overall nesting effort and including it could result in overestimating its contribution.

[b] Virginia was the most northern area sampled for the study (Bass *et al.* 1998)

Mixing trends have been found for loggerheads in pelagic waters. In the Mediterranean Sea, about 45 - 47 percent of the pelagic loggerheads can be traced to the South Florida subpopulation and about 2 percent are from the northern subpopulation, while only about 51 percent originated from Mediterranean nesting beaches (Laurent et al. 1998). In the vicinity of the Azores and Madiera Archipelagoes, about 19 percent of the pelagic loggerheads are from the northern subpopulation, about 71 percent are from the South Florida subpopulation, and about 11 percent are from the Yucatán subpopulation (Bolten et al. 1998).

Further testing of loggerhead turtles from foraging areas north of Virginia is needed to assess the proportion of northern subpopulation turtles that occur on northern foraging grounds. A recent analysis (Rankin-Baransky *et al.* 2001) of 79 loggerhead sea turtles that stranded from Virginia to Massachusetts determined that the turtles originated from three nesting areas: the northeast Florida/North Carolina (25% ± 10%), south Florida (59% ± 14%), and Quintana Roo, Mexico (16% ± 7%) (Rankin-Baransky *et al.* 2001). However, these results should be reviewed with caution given that the majority (51) of the sampled turtles were obtained from the most northern point of the study (Barnstable County, Massachusetts). Nonetheless, they do provide new information on the complexity of loggerhead movements from the various nesting areas and suggest that the number of loggerhead turtles originating from the northern and south Florida subpopulations does not vary proportionally along the coast.

Loggerhead sea turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years before settling into benthic environments. Turtles in this life history stage are called "pelagic immatures" and are best known from the eastern Atlantic near the Azores and Madeira, and have been reported from the Mediterranean as well as the eastern Caribbean (Bjorndal et al., in press). Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm straight-line carapace length (SCL) they move to coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico. However, recent studies have suggested that not all loggerhead sea turtles follow the model of circumnavigating the North Atlantic Gyre as pelagic immatures, after which they settle permanently into benthic environments. Some may not totally circumnavigate the north Atlantic before moving to benthic habitats, while others may either remain in the pelagic habitat longer than hypothesized or move back and forth between pelagic and coastal habitats (Witzell in prep.).

Benthic immatures have been found from Cape Cod, Massachusetts, to southern Texas, and occasionally strand on beaches in northeastern Mexico (R. Márquez-M., pers. comm.). Large benthic immature loggerheads (70-91 cm) represent a larger proportion of the strandings and in-water captures (Schroeder et al. 1998) along the southern and western coasts of Florida as compared with the rest of the coast, but it is not known whether the larger animals are actually more abundant in these areas or just more abundant within the area relative to the smaller turtles. Given an estimated age at maturity of 17-35 years (Frazer and Ehrhart 1985; B. Schroeder, pers. comm.), the benthic immature stage must be at least 10-25 years long. As discussed in the beginning of this section, adult loggerheads nest primarily from North Carolina southward to Florida with additional nesting assemblages in the Florida Panhandle and on the Yucatán

Peninsula. Non-nesting, adult female loggerheads are reported throughout the U.S. and Caribbean Sea; however, little is known about the distribution of adult males who are seasonally abundant near nesting beaches during the nesting season.

Aerial surveys suggest that loggerheads (benthic immatures and adults) in U.S. waters are distributed in the following proportions: 54% in the southeast U.S. Atlantic, 29% in the northeast U.S. Atlantic, 12% in the eastern Gulf of Mexico, and 5% in the western Gulf of Mexico (TEWG 1998). Like other sea turtles, the movements of loggerheads are influenced by water temperature. Since they are limited by water temperatures, loggerhead sea turtles do not usually appear on the northern summer foraging grounds until June, but can be found in Virginia as early as April. The large majority leave the Gulf of Maine by mid-September but may remain in the Northeast and mid-Atlantic waters until as late as November or December (Epperly et al. 1995; Keinath 1993; Morreale 1999; Shoop and Kenney 1992). Aerial surveys of loggerhead turtles north of Cape Hatteras indicate that they are most common in waters from 22 to 49 m deep, although they range from the beach to waters beyond the continental shelf (Shoop and Kenney 1992). There is limited information regarding the activity of these offshore turtles. Loggerhead sea turtles are primarily benthic feeders, opportunistically foraging on crustaceans and mollusks (Wynne and Schwartz 1999). Under certain conditions they may also scavenge fish, particularly if they are easy to catch (e.g., caught in nets; NOAA Fisheries and USFWS 1991b).

Status and trend of loggerhead sea turtles

Based on the data available, it is difficult to estimate the size of the loggerhead sea turtle population in the U.S. or its territorial waters. There is, however, general agreement that the number of nesting females provides a useful index of the species' population size and stability at this life stage. Nesting data collected on index nesting beaches in the U.S. from 1989-1998 represent the best dataset available to index the population size of loggerhead sea turtles. However, an important caveat is that a population trends analysis based on nesting beach data may reflect trends in adult nesting females, but may not reflect overall population growth rates. Given this, between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts ranged from 53,014 to 92,182 annually, with a mean of 73,751. Since a female often lays multiple nests in any one season, the average adult female population of 44,780 was calculated using the equation [(nests/4.1) * 2.5]. These data provide an annual estimate of the number of nests laid per year while indirectly estimating both the number of females nesting in a particular year (based on an average of 4.1 nests per nesting female; Murphy and Hopkins (1984) and of the number of adult females in the entire population (based on an average remigration interval of 2.5 years; Richardson et al. 1978). On average, 90.7% of these nests were of the south Florida subpopulation, 8.5% were from the northern subpopulation, and 0.8% were from the Florida Panhandle nest sites. There is limited nesting throughout the Gulf of Mexico west of Florida, but it is not known to what subpopulation the turtles making these nests belong. Based on the above, it is estimated that there are only approximately 3,800 nesting females in the northern loggerhead subpopulation. The status of this northern population based on number of loggerhead nests has been classified as stable, at best, or declining (TEWG 2000).

The role of males from the northern subpopulation also needs further investigation. Using genetics data from Texas, South Carolina, and North Carolina in combination with juvenile sex ratios from those states, NOAA Fisheries scientists estimate that the northern subpopulation produces 65% males, while the much larger south Florida subpopulation is estimated to produce 80% females (NOAA Fisheries SEFSC 2001). New results from nuclear DNA analyses indicate that males do not show the same degree of site fidelity as do females. It is possible then that the high proportion of males produced in the northern subpopulation are an important source of males throughout the southeast U.S., lending even more significance to the critical nature of this small subpopulation (NOAA Fisheries SEFSC 2001).

Several published reports have presented the problems facing long-lived species that delay sexual maturity (Crouse et al. 1987, Crowder et al. 1994, Crouse 1999). In general, these reports concluded that animals that delay sexual maturity and reproduction must have high annual survival as juveniles through adults to ensure that enough juveniles survive to reproductive maturity and then reproduce enough times to maintain stable population sizes. This general rule applies to sea turtles, particularly loggerhead sea turtles, as the rule originated in studies of sea turtles (Crouse et al. 1987, Crowder et al. 1994, Crouse 1999).. Crouse (1999) concluded that relatively small decreases in annual survival rates of both juvenile and adult loggerhead sea turtles will adversely affect large segments of the total loggerhead sea turtle population. The survival of hatchlings seems to have the least amount of influence on the survivorship of the species, but historically, the focus of sea turtle conservation has been involved with protecting the nesting beaches. While nesting beach protection and hatchling survival are important, recovery efforts and limited resources might be more effective by focusing on the protection of juvenile and adult sea turtles.

Threats to loggerheads' recovery
The five major subpopulations of loggerhead sea turtles in the northwest Atlantic—northern, south Florida, Florida panhandle, Yucatán, and Dry Tortugas—are all subject to fluctuations in the number of young produced annually because of human-related activities as well as natural phenomena. Loggerhead sea turtles face numerous threats from natural causes. For example, there is a significant overlap between hurricane seasons in the Caribbean Sea and northwest Atlantic Ocean (June to November), and the loggerhead sea turtle nesting season (March to November). Sand accretion and rainfall that result from these storms as well as wave action can appreciably reduce hatchling success. Other sources of natural mortality include cold stunning and biotoxin exposure.

The diversity of the sea turtles' life history leaves them susceptible to many human impacts, including impacts while they are on land, in the benthic environment, and in the pelagic environment. On their nesting beaches in the U.S., adult female loggerheads as well as hatchlings are threatened with beach erosion, armoring, and nourishment; artificial lighting; beach cleaning; increased human presence; recreational beach equipment; beach driving; coastal construction and fishing piers; exotic dune and beach vegetation; predation by species such as exotic fire ants, raccoons (*Procyon lotor*), armadillos (*Dasypus novemcinctus*), and opossums (*Didelphus virginiana*); and poaching. Although sea turtle nesting beaches are protected along large expanses of the northwest Atlantic coast (in areas like Merrit Island, Archie Carr, and Hobe Sound National Wildlife Refuges), other areas along these coasts have limited or no protection and probably cause fluctuations in sea turtle nesting success. For example, Volusia County, Florida, allows motor vehicles to drive on sea turtle nesting beaches (the County has filed suit against the U.S. Fish and Wildlife Service to retain this right). Sea turtle nesting and hatching success on unprotected high density east Florida nesting beaches from Indian River to Broward County are affected by all of the above threats.

Loggerhead sea turtles are impacted by a completely different set of anthropogenic threats once they migrate to the ocean. Pelagic immature loggerhead sea turtles from these four subpopulations circumnavigate the North Atlantic over several years (Carr 1987, Bjorndal et al. 1994). During that period, they are exposed to a series of long-line fisheries that include the U.S. Atlantic tuna and swordfish longline fisheries, an Azorean long-line fleet, a Spanish long-line fleet, and various fleets in the Mediterranean Sea (Aguilar et al. 1995, Bolten et al. 1994, Crouse 1999). Observer records indicate that an estimated 6,544 loggerheads were captured by the U.S. Atlantic tuna and swordfish longline fleet between 1992-1998, of which an estimated 43 were dead (Yeung et al. 2000). Logbooks and observer records indicated that loggerheads readily ingest hooks (Witzell 1999).

In waters off the coastal U.S., loggerhead sea turtles are exposed to a suite of fisheries in Federal and State waters including trawl, purse seine, hook and line, gillnet, pound net, longline, and trap fisheries. For example, loggerhead sea turtles have been captured in fixed pound net gear in the Long Island Sound, in pound net gear and trawls in summer flounder and other finfish fisheries in the mid-Atlantic and Chesapeake Bay, and in gillnet fisheries (e.g., monkfish, spiny dogfish) in the mid-Atlantic and elsewhere. The take of sea turtles, including loggerheads, in shrimp fisheries off the Atlantic coast have been well documented. It has previously been observed that loggerhead turtle populations along the southeastern Atlantic coast declined where shrimp fishing was intense off the nesting beaches but, conversely, did not appear to be declining where nearshore shrimping effort was low or absent (Magnuson et al. 1990).

In addition to fishery interactions, loggerhead sea turtles also face other threats in the marine environment, including the following: oil and gas exploration, development, and transportation; marine pollution; underwater explosions; hopper dredging, offshore artificial lighting; power plant entrainment and/or impingement; entanglement in debris; ingestion of marine debris; marina and dock construction and operation; boat collisions; and poaching.

3.4 Leatherback Sea Turtle

The leatherback is the largest living turtle and ranges farther than any other sea turtle species, exhibiting broad thermal tolerances (NOAA Fisheries and USFWS 1995). Leatherback turtles feed primarily on cnidarians (medusae, siphonophores) and tunicates (salps, pyrosomas) and are often found in association with jellyfish. These turtles are found throughout the action area of this consultation and, while predominantly pelagic, they occur annually in places such as Cape Cod Bay and Narragansett Bay during certain times of the year, particularly the fall.

Although leatherbacks are a long lived species (> 30 years), they mature at a younger age than loggerhead turtles, with an estimated age at sexual maturity of about 13-14 years for females, and an estimated minimum age at sexual maturity of 5-6 years, with 9 years reported as a likely minimum (Zug and Parham 1996) and 19 years as a likely maximum (NOAA Fisheries SEFSC 2001). In the U.S. and Caribbean, female leatherbacks nest from March through July. They nest frequently (up to 7 nests per year) during a nesting season and nest about every 2-3 years. During each nesting, they produce 100 eggs or more in each clutch and thus can produce 700 eggs or more per nesting season (Schulz 1975). However, a significant portion (up to approximately 30%) of the eggs can be infertile. Thus, the actual proportion of eggs that can result in hatchlings is less than this seasonal estimate. The eggs will incubate for 55-75 days before hatching. Based on a review of all sightings of leatherback sea turtles of <145 cm curved carapace length (ccl), Eckert (1999) found that leatherback juveniles remain in waters warmer than 26°C until they exceed 100 cm ccl.

Nest counts are the only reliable population information available for leatherback turtles. Recent declines have been seen in the number of leatherbacks nesting worldwide (NOAA Fisheries and USFWS 1995). The 1995 status review notes that it is unclear whether this observation is due to natural fluctuations or whether the population is at serious risk. Globally, leatherback populations have been decimated worldwide. The population was estimated to number approximately 115,000 adult females in 1980 and only 34,500 by 1995 (Spotila et al. 1996). The decline can be attributed to many factors including fisheries and intense exploitation of the eggs (Ross 1979). Spotila et al. (1996) record that adult mortality has also increased significantly, particularly as a result of driftnet and longline fisheries. The Pacific population appears to be in a critical state of decline, now estimated to number less than 3,000 total adult and subadult animals (Spotila et al. 2000). The status of the Atlantic population is less clear. In 1996, it was reported to be stable, at best (Spotila et al. 1996), but numbers in the Western Atlantic at that writing were reported to be on the order of 18,800 nesting females. According to Spotila (pers. comm.), the Western Atlantic population numbered about 15,000 nesting females in 2000, whereas current estimates for the Caribbean (4,000) and the Eastern Atlantic (i.e., off Africa, numbering ~ 4,700) have remained consistent with numbers reported by Spotila et al. in 1996. With regard to repercussions of these observations for the U.S. leatherback populations in general, it is unknown whether they are stable, increasing, or declining, but it is certain that some nesting populations (e.g., St. John and St. Thomas, U.S. Virgin Islands) have been extirpated.

The nesting population of leatherback sea turtles in the Suriname-French Guiana trans-boundary region has been declining since 1992 (Chevalier and Girondot 1998). Poaching and fishing gear interactions are, once again, believed to be the major contributors to the decline of leatherbacks in the area (Chevalier *et al.* in press, Swinkels *et al.* in press). While Spotila et al. (1996) indicated that turtles may have been shifting their nesting from French Guiana to Suriname due to beach erosion, analyses show that the overall area trend in number of nests has been negative since 1987 at a rate of 15.0 -17.3 % per year (NOAA Fisheries SEFSC 2001). If turtles are not nesting elsewhere, it appears that the Western Atlantic portion of the population is being subjected to mortality beyond sustainable levels, resulting in a continued decline in numbers of nesting females. Tag return data emphasize the global nature of the leatherback and the link between these South American nesters and animals found in U.S. waters. For example, a nesting female tagged May 29, 1990, in French Guiana was later recovered and released alive from the York River, VA. Another nester tagged in French Guiana on June 21, 1990, was later found dead in Palm Beach, Florida (STSSN database).

Anthropogenic impacts

Anthropogenic impacts to the leatherback population are similar to those discussed above for the loggerhead sea turtle. However, of the Atlantic turtle species, leatherbacks seem to be the most vulnerable to entanglement in fishing gear. This susceptibility may be the result of their body type (large size, long pectoral flippers, and lack of a hard shell), and their attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, and perhaps to the lightsticks used to attract target species in longline fisheries. Sea turtles entangled in fishing gear generally have a reduced ability to feed, dive, surface for air, or perform other behaviors essential to survival (Balazs 1985). They may be more susceptible to boat strikes if forced to remain at the surface, and entangling lines can constrict blood flow resulting in tissue necrosis.

At a workshop held in the Northeast in 1998 to develop a management plan for leatherbacks, experts expressed the opinion that incidental takes in fisheries were likely higher than is being reported. From 1990-2000, 92 entangled leatherbacks in lines associated with trap/pot gear were reported from New York through Maine (Dwyer *et al.* 2002). Anecdotal accounts by fishermen suggest that they have many more encounters than are reported. Entanglement in other pot gear set for other species of shellfish and finfish in the action area has also been documented. Prescott (1988) reviewed stranding data for Cape Cod Bay and concluded that for those turtles where cause of death could be determined (the minority), entanglement is the leading cause of death followed by capture in trawls, cold stunning, or collision with boats. Leatherbacks have also been documented entangled in crab pot gear in the Virginia Chesapeake Bay (e.g., 3 instances in 2002 alone).

Leatherbacks are taken as bycatch in several fisheries including the pelagic longline, coastal trawl, anchored gillnet, and pelagic gillnet. For instance, according to observer records, an estimated 6,363 leatherback sea turtles were caught by the U.S. Atlantic tuna and swordfish longline fisheries between 1992-1999, of which 88 were released dead (NOAA Fisheries SEFSC 2001). Leatherbacks are foul hooked by longline gear (*e.g.*, on the flipper or shoulder area) rather than mouth or throat hooked like loggerheads.

3.5 Kemp's Ridley Sea Turtle

The Kemp's ridley is the most endangered of the world's sea turtle species. Of the world's seven extant species of sea turtles, the Kemp's ridley has declined to the lowest population level. Kemp's ridleys nest primarily on Rancho Nuevo in Tamaulipas, Mexico, where nesting females emerge synchronously during the day to nest in aggregations known as arribadas. Most of the population of adult females nest in this single locality (Pritchard 1969).

Kemp's ridley nesting occurs from April through July each year. Little is known about mating but it is believed to occur at or before the nesting season in the vicinity of the nesting beach. Hatchlings emerge after 45-58 days. Once they leave the beach, neonates presumably enter the Gulf of Mexico where they feed on available sargassum and associated infauna or other epipelagic species (USFWS and NOAA Fisheries 1992). Research conducted by Texas A&M University has resulted in the intentional live-capture of hundreds of Kemp's ridleys at Sabine

Pass and the entrance to Galveston Bay. Between 1989 and 1993, 50 of the Kemp's ridleys captured were tracked (using satellite and radio telemetry) by biologists with the NOAA Fisheries Galveston Laboratory. The tracking study was designed to characterize sea turtle habitat and to identify small and large scale migration patterns. Preliminary analysis of the data collected during these studies suggests that subadult Kemp's ridleys stay in shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida coast (Renaud, NOAA Fisheries Galveston Laboratory, pers. comm.). Ogren (1988) suggests that the Gulf coast, from Port Aransas, Texas, through Cedar Key, Florida, represents the primary habitat for subadult ridleys in the northern Gulf of Mexico. However, at least some juveniles will travel northward as water temperatures warm to feed in productive coastal waters of Georgia through New England (USFWS and NOAA Fisheries 1992).

Juvenile Kemp's ridleys use northeastern and mid-Atlantic coastal waters of the U.S. Atlantic as primary developmental habitat during summer months, with shallow coastal embayments serving as important foraging grounds. Studies have found that post-pelagic ridleys feed primarily on crabs, consuming a variety of species. Mollusks, shrimp, and fish are consumed less frequently (Bjorndal 1997). Morreale and Standora (1992) found that in New York waters, spider crabs and rock crabs comprised a disproportionately high percentage of the turtles' diets relative to their abundance and distribution in the area. The authors suggest that these slow-moving crabs are easy prey for inexperienced juveniles who are foraging in benthic environments for the first time. In the Chesapeake Bay, where the juvenile population of Kemp's ridley sea turtles was estimated to be 211 to 1,083 turtles (Musick and Limpus 1997), ridleys frequently forage in areas supporting submerged aquatic vegetation (Lutcavage and Musick 1985; Bellmund et al. 1987; Keinath et al. 1987; Musick and Limpus 1997).

With the onset of winter and the decline of water temperatures, Kemp's ridleys migrate to more southerly waters from September to November (Keinath et al. 1987; Musick and Limpus 1997). Turtles that do not head south before water temperatures drop rapidly face the risk of cold-stunning. Although cold stunning can occur throughout the range of the species, cold stunning can be a significant natural cause of mortality for sea turtles in Cape Cod Bay and Long Island Sound. For example, in the winter of 1999/2000, there was a major cold-stunning event in which 218 Kemp's ridleys, 54 loggerheads, and 5 green turtles were found on Cape Cod beaches (Prescott, pers. comm.). Annual cold stun events only occasionally occur at this magnitude; the extent of episodic major cold stun events may be associated with numbers of turtles utilizing northeast waters in a given year, oceanographic conditions and the occurrence of storm events in the late fall. Cold stunned turtles have also been reported on beaches in New York and New Jersey (Morreale et al. 1992). Although cold stunned turtles can survive if found early enough, cold stunning events can represent a significant cause of natural mortality.

From telemetry studies, Morreale and Standora (1994) determined that Kemp's ridleys are sub-surface animals that frequently swim to the bottom while diving. The generalized dive profile showed that the turtles spend 56% of their time in the upper third of the water column, 12% in mid-water, and 32% on the bottom. In water deeper than 15 m (50 ft), the turtles dive to a depth of six to ten meters, but spend a considerable portion of their time in the upper portion of the water column. In contrast, turtles in shallower water dive to depth, spending as much as 50% of the dive on the bottom.

Status and trends of Kemp's ridley sea turtles
When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963), but the population has been drastically reduced from these historical numbers. However, the TEWG (1998; 2000) indicated that the Kemp's ridley population appears to be in the early stage of exponential expansion. Nesting data, estimated number of adults, and percentage of first time nesters have all increased from lows experienced in the 1970's and 1980's. From 1985 to 1999, the number of nests observed at Rancho Nuevo and nearby beaches has increased at a mean rate of 11.3% per year, allowing cautious optimism that the population is on its way to recovery. For example, data from nests at Rancho Nuevo, North Camp and South Camp, Mexico, have indicated that the number of adults declined from a population that produced 6,000 nests in 1966 to a population that produced 924 nests in 1978 and 702 nests in 1985 then increased to produce 1,940 nests in 1995 and about 3,400 nests in 1999. Estimates of adult abundance followed a similar trend from an estimate of 9,600 in 1966 to 1,050 in 1985 and 3,000 in 1995. The increased recruitment of new adults is illustrated in the proportion of neophyte, or first time nesters, which has increased from 6% to 28% from 1981 to 1989 and from 23% to 41% from 1990 to 1994.

The TEWG (1998) developed a population model to evaluate trends in the Kemp's ridley population through the application of empirical data and life history parameter estimates chosen by the TEWG. Model results identified three trends in benthic immature Kemp's ridleys. Benthic immatures are those turtles that are not yet reproductively mature but have recruited to feed in the nearshore benthic environment where they are available to nearshore mortality sources that often result in strandings. Benthic immature ridleys are estimated to be 2-9 years of age and 20-60 cm in length. Increased production of hatchlings from the nesting beach beginning in 1966 resulted in an increase in benthic ridleys that leveled off in the late 1970s. A second period of increase followed by leveling occurred between 1978 and 1989 as hatchling production was further enhanced by the cooperative program between the USFWS and Mexico's Instituto Nacional de Pesca to increase the nest protection and relocation program in 1978. A third period of steady increase, which has not leveled off to date, has occurred since 1990 and appears to be due to the greatly increased hatchling production and an apparent increase in survival rates of immature turtles beginning in 1990 due, in part, to the introduction of TEDs.

The population model in the TEWG report projected that Kemp's ridleys could reach the intermediate recovery goal identified in the Recovery Plan, of 10,000 nesters by the year 2020 if the assumptions of age to sexual maturity and age specific survivorship rates plugged into their model are correct. The TEWG (1998) identified an average Kemp's ridley population growth rate of 13% per year between 1991 and 1995. Total nest numbers have continued to increase. However, the 1996 and 1997 nest numbers reflected a slower rate of growth, while the increase in the 1998 nesting level has been much higher and decreased in 1999. The population growth rate does not appear as steady as originally forecasted by the TEWG, but annual fluctuations, due in part to irregular inter-nesting periods, are normal for other sea turtle populations. Also, as populations increase and expand, nesting activity would be expected to be more variable.

One area for caution in the TEWG findings is that the area surveyed for ridley nests in Mexico was expanded in 1990 due to destruction of the primary nesting beach by Hurricane Gilbert. Because systematic surveys of the adjacent beaches were not conducted prior to 1990, there is no way to determine what proportion of the nesting increase documented since that time is due to the increased survey effort rather than an expanding ridley nesting range. The TEWG (1998) assumed that the observed increases in nesting, particularly since 1990, were true increases rather than the result of expanded beach coverage. As noted by TEWG, trends in Kemp's ridley nesting even on the Rancho Nuevo beaches alone suggest that recovery of this population has begun but continued caution is necessary to ensure recovery and to meet the goals identified in the Kemp's Ridley Recovery Plan.

Threats to Kemp's ridleys' recovery
Like other turtle species, the severe decline in the Kemp's ridley population appears to have been heavily influenced by a combination of exploitation of eggs and impacts from fishery interactions. From the 1940's through the early 1960's, nests from Rancho Nuevo were heavily exploited, but beach protection in 1966 helped to curtail this activity (USFWS and NOAA Fisheries 1992). Currently, anthropogenic impacts to the Kemp's ridley population are similar to those discussed above for other sea turtle species. Sea sampling coverage in the Northeast otter trawl fishery, pelagic longline fishery, and southeast shrimp and summer flounder bottom trawl fisheries have recorded takes of Kemp's ridley turtles. Following World War II, there was a substantial increase in the number of trawl vessels, particularly shrimp trawlers, in the Gulf of Mexico where the adult Kemp's ridley turtles occur. Information from fishers helped to demonstrate the high number of turtles taken in these shrimp trawls (USFWS and NOAA Fisheries 1992). Subsequently, NOAA Fisheries has worked with the industry to reduce turtle takes in shrimp trawls and other trawl fisheries, including the development and use of Turtle Excluder Devices (TEDs).

Kemp's ridleys may also be affected by large-mesh gillnet fisheries. In the spring of 2000, a total of five Kemp's ridley carcasses were recovered from the same North Carolina beaches where 277 loggerhead carcasses were found. Cause of death for most of the turtles recovered was unknown, but the mass mortality event was suspected to have been from a large-mesh gillnet fishery operating offshore in the preceding weeks. The five ridley carcasses that were found are likely to have been only a minimum count of the number of Kemp's ridleys that were killed or seriously injured as a result of the fishery interaction since it is unlikely that all of the carcasses washed ashore. It is possible that strandings of Kemp's ridley turtles in some years have increased at rates higher than the rate of increase in the Kemp's ridley population (TEWG 1998).

3.6 Green Sea Turtle

Green turtles are the largest chelonid (hard-shelled) sea turtle, with an average adult size of 91 cm SCL and weight of 150 kg. Ninety percent of green turtles found in Long Island Sound are between 25 and 40 cm SCL, with the largest reported being 68 cm (Burke et al. 1991). Based on growth rate studies of wild green turtles, greens have been found to grow slowly with an estimated age of sexual maturity ranging from 18 to 40 years (Balazs 1982, Frazer and Ehrhart

1985, B. Schroeder pers. comm.).

Green turtles are distributed circumglobally. In the western Atlantic they range from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean (Wynne and Schwartz 1999). As is the case for loggerhead and Kemp's ridley sea turtles, green sea turtles use mid-Atlantic and northern areas of the western Atlantic Ocean as important summer developmental habitat. Green turtles are found in estuarine and coastal waters as far north as Long Island Sound, Chesapeake Bay, and North Carolina sounds (Musick and Limpus 1997). Limited information is available regarding the occurrence of green turtles in the Massachusetts Bay, although they are presumably present in very low numbers. Like loggerheads and Kemp's ridleys, green sea turtles that use northern waters during the summer must return to warmer waters when water temperatures drop, or face the risk of cold stunning. Cold stunning of green turtles may occur in southern areas as well (i.e., Indian River, Florida), as these natural mortality events are dependent on water temperatures and not solely geographical location.

In the continental United States, green turtle nesting occurs on the Atlantic coast of Florida (Ehrhart 1979). Occasional nesting has been documented along the Gulf coast of Florida, on southwest Florida beaches, and the beaches on the Florida Panhandle (Meylan et al. 1995). Certain Florida nesting beaches where most green turtle nesting activity occurs have been designated index beaches. Index beaches were established to standardize data collection methods and effort on key nesting beaches. The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of the index beaches in 1989, perhaps due to increased protective legislation throughout the Caribbean (Meylan et al. 1995). Recently, green turtle nesting occurred on Bald Head Island, North Carolina just east of the mouth of the Cape Fear River, on Onslow Island, and on Cape Hatteras National Seashore. Increased nesting has also been observed along the Atlantic Coast of Florida, on beaches where only loggerhead nesting was observed in the past (Pritchard 1997). Recent population estimates for green turtles in the western Atlantic area are not available.

While nesting activity is obviously important in assessing population trends, the remaining portion of the green turtle's life is spent on the foraging and breeding grounds. Juvenile green sea turtles occupy pelagic habitats after leaving the nesting beach. Pelagic juveniles are assumed to be omnivorous, but with a strong tendency toward carnivory during early life stages. At approximately 20 to 25 cm carapace length, juveniles leave pelagic habitats and enter benthic foraging areas, shifting to a chiefly herbivorous diet (Bjorndal 1997). Green turtles appear to prefer marine grasses and algae in shallow bays, lagoons and reefs (Rebel 1974), but also consume jellyfish, salps, and sponges. Some of the principal feeding pastures in the western Atlantic Ocean include the upper west coast of Florida and the northwestern coast of the Yucatan Peninsula. Additional important foraging areas in the western Atlantic include the Mosquito and Indian River Lagoon systems and nearshore wormrock reefs between Sebastian and Ft. Pierce Inlets in Florida, Florida Bay, the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean Coast of Panama, and scattered areas along Colombia and Brazil (Hirth 1971). The preferred food sources in these areas are *Cymodocea, Thalassia, Zostera, Sagittaria,* and *Vallisneria* (Carr 1952). The summer developmental habitat for green turtles also encompasses estuarine and coastal waters of Chesapeake Bay and as far north as Long Island Sound (Musick and Limpus 1997).

Threats to green turtles' recovery
In 1978, the green turtle was listed as threatened under the ESA, except for the breeding populations in Florida and on the Pacific coast of Mexico, which were listed as endangered (NOAA Fisheries and USFWS 1991a). Green turtles were traditionally highly prized for their flesh, fat, eggs, and shell, and directed fisheries in the United States and throughout the Caribbean are largely to blame for the decline of the species. In the Gulf of Mexico, green turtles were once abundant enough in the shallow bays and lagoons to support a commercial fishery. In 1890, over one million pounds of green turtles were taken in the Gulf of Mexico green sea turtle fishery (Doughty 1984). However, declines in the turtle fishery throughout the Gulf of Mexico were evident by 1902 (Doughty 1984).

Fibropapillomatosis, an epizootic disease producing lobe-shaped tumors on the soft portion of a turtle's body, has been found to infect green turtles, most commonly juveniles. The occurrence of fibropapilloma tumors, most frequently documented in Hawaiian green turtles, may result in impaired foraging, breathing, or swimming ability, leading potentially to death.

Green turtles continue to be heavily exploited by humans, with the degradation of nesting and foraging habitats, incidental capture in fisheries, and marine pollution acknowledged as serious hindrances to species recovery. As with the other sea turtle species, fishery mortality accounts for a large proportion of annual anthropogenic mortality outside the nesting beaches, while other activities like dredging, pollution, and habitat destruction account for an unknown level of mortality. Sea sampling coverage in the pelagic driftnet, pelagic longline, scallop dredge, southeast shrimp trawl, and summer flounder bottom trawl fisheries has recorded takes of green turtles. Stranding reports indicate that between 200-400 green turtles strand annually along the Eastern U.S. coast from a variety of causes, most of which are unknown (Sea Turtle Stranding and Salvage Network, unpublished data).

3.7 Hawksbill Sea Turtle

The hawksbill turtle is relatively uncommon in the waters of the continental United States. Hawksbills prefer coral reefs, such as those found in the Caribbean and Central America. However, there are accounts of hawksbills in south Florida and a surprising number are encountered in Texas. Most of the Texas records report small turtles, probably in the 1-2 year class range. Many captures or strandings are of individuals in an unhealthy or injured condition (Hildebrand 1982). The lack of sponge-covered reefs and the cold winters in the northern Gulf of Mexico probably prevent hawksbills from establishing a viable population in this area. In the north Atlantic, small hawksbills have stranded as far north as Cape Cod, Massachusetts (STSSN database). Many of these strandings were observed after hurricanes or offshore storms.

Hawksbills feed primarily on a wide variety of sponges but also consume bryozoans, coelenterates, and mollusks. The Culebra Archipelago of Puerto Rico contains especially important foraging habitat for hawksbills. Nesting areas in the western North Atlantic include

Puerto Rico and the Virgin Islands.

No takes of hawksbill sea turtles have been recorded in northeast or mid-Atlantic fisheries covered by the NEFSC observer program.

4.0 ENVIRONMENTAL BASELINE

Environmental baselines for biological opinions include the past and present impacts of all state, federal or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation in process (50 CFR 402.02). The environmental baseline for this biological opinion includes the effects of several activities that may affect the survival and recovery of threatened and endangered species in the action area. The activities that shape the environmental baseline in the action area of this consultation include vessel operations, fisheries, discharges, dredging, ocean dumping, sonic activities, and recovery activities associated with reducing those impacts. However, all of the listed species that occur in the action area are highly migratory and can thus be affected by activities anywhere in a wide range that encompasses areas throughout the North Atlantic Ocean, Gulf of Mexico, and the Caribbean Sea.

Due to logistical difficulties associated with most marine activities and the significant amount of resources necessary to design effective monitoring programs, monitoring the effects of the various federal actions on threatened and endangered species has not been consistent for all species groups and all projects. For example, the most reliable method for monitoring fishery interactions is the sea sampling program, which provides random sampling of commercial fishing activities. However, due to the size, power, and mobility of whales, sea sampling is only effective for sea turtles. Although takes of whales are occasionally observed by the sea sampling program, levels of interaction between whales and fishing vessels and their gear is derived from data collected opportunistically. It is often impossible to assign gear found on stranded or free-swimming animals to a specific fishery. Consequently, the total level of interaction between fisheries and whales is unknown.

4.1 Fishery Operations

NOAA Fisheries has undertaken several ESA section 7 consultations to address the effects of vessel operations and gear associated with federally-permitted fisheries on threatened and endangered species in the action area. Each of those consultations sought to develop ways of reducing the probability of adverse impacts of the action on listed species. Similarly, recovery actions NOAA Fisheries has undertaken under both the Marine Mammal Protection Act (MMPA) and the ESA are addressing the problem of take of whales in the fishing and shipping industries.

4.1.1 Federal Fishery Operations
Several commercial fisheries operating in the action area use gear that is known to take listed species. Efforts to reduce the adverse effects of commercial fisheries are addressed through both

the MMPA take reduction planning process and the ESA section 7 process. Federally regulated gillnet, longline, trawl, seine, dredge, and pot fisheries have all been documented as interacting with either whales or sea turtles or both. Other gear types may impact whales and sea turtles as well. For all fisheries for which there is a federal fishery management plan (FMP) or for which any federal action is taken to manage that fishery, impacts have been evaluated through the section 7 process.

Formal ESA section 7 consultation has been conducted on the following fisheries which may adversely affect threatened and endangered species in the action area: American Lobster, Multispecies, Monkfish, Summer Flounder/Scup/Black Sea Bass, Atlantic Mackerel/Squid/Butterfish, Atlantic Bluefish, Atlantic Herring, Spiny Dogfish, Tilefish, Scallop, Red Crab, Skate, and Highly Migratory Species. These consultations are summarized below.

Serious injuries and mortality of endangered whales have occurred as a result of interactions with gear used in the *American lobster pot fishery*. NOAA Fisheries is addressing the interaction between the lobster trap fishery and endangered whales in the Atlantic Large Whale Take Reduction Plan (ALWTRP). NOAA Fisheries reinitiated consultation on the lobster fishery on May 4, 2000, as a result of new entanglements of right whales in fixed gear, information on the status of the northern right whale and changes to the ALWTRP measures which modified operation of the lobster fishery. Previous consultations on this fishery had concluded that the fishery was not likely to jeopardize the continued existence of any ESA-listed species under NOAA Fisheries jurisdiction provided the fishery operated in accordance with measures developed under the ALWTRP. The BO concluded on June 14, 2001, that the lobster trap fishery as modified by the existing ALWTRP did not avoid the likelihood of jeopardizing northern right whales (NOAA Fisheries 2001a). A new RPA was provided that was expected to remove the risks that continued implementation of the American Lobster regulations posed to North Atlantic right whales. The RPA consisted of several measures, but primary amongst these were Seasonal Area Management (SAM) (seasonal restrictions of specific fishing areas when right whales are present), Dynamic Area Management (DAM) (restriction of defined fishing areas when specified concentrations of right whales occur unexpectedly), and gear modifications to reduce the amount of floating line in the water. Consultation on the American lobster pot fishery was reinitiated in 2002 to consider the effects of implementation of historical participation for parts of the Federal lobster management area, and implementation of a conservation equivalency measure for state-permitted New Hampshire lobster fishers who also held a federal lobster permit. On October 31, 2002, this consultation concluded that the proposed action was not likely to jeopardize the continued existence of any ESA-listed species under NOAA Fisheries jurisdiction but was expected to result in the take of one additional leatherback sea turtle biennially (NOAA Fisheries 2002b).

However, a right whale that was successfully disentangled in 2002 exhibited gear consistent with that used in the inshore lobster trap fishery. The whale washed ashore dead six weeks after disentanglement. The carcass was decomposed and damaged by wave action, but the necropsy report revealed the most likely cause of death to be infection or other complications initiated by the damage on the portion of the tail stock around which the line had been wrapped. As such, NOAA Fisheries concluded that the entanglement event presented enough new information to suggest that the RPA provided in the June 14, 2001 BO was not effective at avoiding the likelihood of jeopardy to right whales from the lobster fishery, and reinitiated consultation on July 29, 2003. This consultation is currently ongoing.

The *Multispecies sink gillnet fishery* occurs in the action area and is known to entangle whales and sea turtles. This fishery has historically occurred along the northern portion of the Northeast Shelf Ecosystem from the periphery of the Gulf of Maine to Rhode Island in water depths to 60 fathoms. In recent years, more of the effort in this fishery has occurred in offshore waters and into the Mid-Atlantic. The fishery operates throughout the year with peaks in the spring and from October through February. NOAA Fisheries reinitiated consultation on the Multispecies FMP on May 4, 2000, in order to reevaluate the ability of the Reasonable and Prudent Alternative (RPA) to avoid the likelihood of jeopardy to right whales. The BO concluded that continued implementation of the Multispecies FMP may adversely affect loggerhead, Kemp's ridley and green sea turtles and is likely to jeopardize the existence of the North Atlantic right whale (NOAA Fisheries 2001b). A new RPA was also included to avoid the likelihood that the operation of the gillnet sector of the multispecies fishery would result in jeopardy to North Atlantic right whales. The ITS exempted the lethal or non-lethal take of one loggerhead sea turtle, and one green, leatherback, *or* Kemp's ridley turtle annually.

The federal *Monkfish fishery* occurs in all waters under federal jurisdiction from Maine to the North Carolina/South Carolina border. The monkfish fishery uses several gear types that may entangle protected species. In 1999, observers documented that turtles were taken in excess of the ITS as a result of entanglements in monkfish gillnet gear. NOAA Fisheries reinitiated consultation on the Monkfish FMP on May 4, 2000, in part, to reevaluate the effect of the monkfish gillnet fishery on sea turtles. The BO also considered new information on the status of the northern right whale and new Atlantic Large Whale Take Reduction Plan (ALWTRP) measures, and the ability of the RPA to avoid the likelihood of jeopardy to right whales. The BO concluded that continued implementation of the Monkfish FMP was likely to jeopardize the existence of the North Atlantic right whale. A new RPA was provided that was expected to remove the threat of jeopardy to North Atlantic right whales. In addition, a new ITS was provided for the take of sea turtles in the fishery (NOAA Fisheries 2001g). However, consultation was once again reinitiated on the Monkfish FMP as of February 12, 2003, to consider the effects of Framework Adjustment 2 measures on ESA-listed species. This consultation was completed on April 14, 2003, and concluded that the proposed action is not likely to result in jeopardy to any ESA-listed species under NOAA Fisheries jurisdiction (NOAA Fisheries 2003a). However, takes of sea turtles are still expected to occur, which was reflected in the ITS. The ITS anticipated the take of three loggerheads and one non-loggerhead species (green, leatherback, or Kemp's ridley) in monkfish gillnet gear, and one sea turtle (loggerhead, green, leatherback, or Kemp's ridley) in monkfish trawl gear.

The *Summer Flounder, Scup and Black Sea Bass fisheries* are known to interact with sea turtles. Significant measures have been developed to reduce the take of sea turtles in summer flounder trawls and trawls that meet the definition of a summer flounder trawl by requiring the use of TEDs throughout the year for trawl nets fished from the North Carolina/South Carolina border to Oregon Inlet, NC, and seasonally (March 16-January 14) for trawl vessels fishing between

Oregon Inlet, NC and Cape Charles, VA. Takes may still occur with this gear type in other areas however. Based on the occurrence of gillnet entanglements in other fisheries, the gillnet portion of this fishery could entangle endangered whales. The pot gear and staked trap sectors could also entangle whales and sea turtles. The most recent formal consultation on this fishery concluded that the operation of the fishery may adversely affect but is not likely to jeopardize the continued existence of listed species (NOAA Fisheries 2001d). The ITS anticipated that 19 loggerhead or Kemp's ridley takes (up to five lethal) and two green turtle takes (lethal or non-lethal) may occur annually. However, as a result of new information not considered in previous consultations, NOAA Fisheries has recently reinitiated section 7 consultation on this FMP to consider the effects of the fisheries on ESA-listed whales and sea turtles.

Consultation on the *Atlantic Mackerel/Squid/Atlantic Butterfish fishery* was completed on April 28, 1999. This fishery is known to take sea turtles and may occasionally interact with whales. Several types of gillnet gear may be used in the mackerel/squid/butterfish fishery. Other gear types that may be used in this fishery include midwater and bottom trawl gear, pelagic longline/hook-and-line/handline, pot/trap, dredge, poundnet, and bandit gear. Entanglements or entrapments of whales, sea turtles, and sturgeon have been recorded in one or more of these gear types. (NOAA Fisheries 1999b)

The *Atlantic Bluefish fishery* may pose a risk to protected marine mammals, but is most likely to interact with sea turtles (primarily Kemp's ridleys and loggerheads) given the time and locations where the fishery occurs. Gillnets are the primary gear used to commercially land bluefish. Whales and turtles can become entangled in the buoy lines of the gillnets or in the net panels. Formal consultation on this fishery was completed on July 2, 1999, and NOAA Fisheries concluded that operation of the fishery under the FMP, as amended, is not likely to jeopardize the continued existence of listed species (NOAA Fisheries 1999a). The ITS exempted the annual take of six loggerheads (no more than three dead), six Kemp's ridleys (dead or alive), and one shortnose sturgeon. Although there is a high degree of overlap between the bluefish fishery and other regulated fisheries, observer data suggests that sea turtle takes may be occurring in unregulated fisheries that also harvest bluefish. Takes by vessels harvesting bluefish while fishing for unregulated species have not been previously addressed under the section 7 process.

Section 7 consultation was completed on the *Atlantic Herring* FMP on September 17, 1999, and concluded that the federal herring fishery was not likely to jeopardize the continued existence of threatened or endangered species and not likely to adversely modify designated critical habitat (NOAA Fisheries 1999d). Since much of the herring fishery occurs in state waters, the fishery is managed in these waters under the guidance of the Atlantic States Marine Fisheries Commission (ASMFC). A new *Atlantic herring plan and Amendment 1 to the plan* was approved by the ASMFC in October 1998. This plan is complementary to the New England Fisheries Management Council (NEFMC) FMP for herring and includes similar measures for permitting, recordkeeping /reporting, area-based management, sea sampling, Total Allowable Catch (TAC) management, effort controls, use restrictions, and vessel size limits as well as measures addressing spawning area restrictions, directed mealing, the fixed gear fishery, and internal waters processing operations (transfer of fish to a foreign processor in state waters). The ASMFC plan, implemented through regulations promulgated by member states, is expected to benefit listed species and critical habitat by reducing effort in the herring fishery.

The primary gear types for the *Spiny dogfish fishery* are sink gillnets, otter trawls, bottom longline, and driftnet gear. Sea turtles can be incidentally captured in all gear sectors of this fishery. Turtle takes in 2000 included one dead and one live Kemp's ridley. Since the ITS issued with the August 13, 1999 BO (NOAA Fisheries 1999c) anticipated the take of only one Kemp's ridley (lethally or non-lethally), the incidental take level for the dogfish FMP was exceeded. In addition, a right whale mortality occurred in 1999 as a result of entanglement in gillnet gear that was thought to be attributed to the spiny dogfish fishery (but was later determined not to be). NOAA Fisheries therefore reinitiated consultation on the Spiny Dogfish FMP on May 4, 2000, in order to reevaluate the ability of the RPA to avoid the likelihood of jeopardy to right whales, and the effect of the spiny dogfish gillnet fishery on sea turtles. The BO also considered new information on the status of the North Atlantic right whale and new ALWTRP measures. The BO, signed on June 14, 2001, concluded that continued implementation of the Spiny Dogfish FMP is likely to jeopardize the existence of the North Atlantic right whale (NOAA Fisheries 2001c). A new RPA was provided that was expected to remove the threat of jeopardy to North Atlantic right whales as a result of the gillnet sector of the spiny dogfish fishery. In addition, the ITS anticipated the annual take of three loggerheads (no more than two lethal), one green (lethal or non-lethal), one leatherback (lethal or non-lethal), or one Kemp's ridley (lethal or non-lethal).

Effective July 18, 2003, however, NOAA Fisheries has closed the federal spiny dogfish fishery for the remainder of the spiny dogfish fishing year (through April 30, 2004). The closure was the result of an action by the Spiny Dogfish and Coastal Shark Management Board of the Atlantic States Marine Fisheries Commission (ASMFC), in which an annual quota of 8.8 million pounds and a coastwide trip limit of 7,000 pounds for the commercial spiny dogfish fishery in state waters was approved under the new Spiny Dogfish Interstate Fishery Management Plan. This was contrary to the quota and trip limit set by NOAA Fisheries for the 2003 fishing year (four million pounds with 600 and 300 pound trip limits). Vessel owners with Federal spiny dogfish permits are prohibited from landing spiny dogfish regardless of whether they are fishing in state or federal waters. Federally permitted dealers are also prohibited from purchasing spiny dogfish from federally permitted spiny dogfish vessels for the remainder of the fishing year. The states are proceeding with the fishery in state waters at the higher quota and trip limits (68 FR 11346, March 10, 2003; ASMFC Press Release February 26, 2003).

The management unit for the *Tilefish* FMP is all golden tilefish under U.S. jurisdiction in the Atlantic Ocean north of the Virginia/North Carolina border. Tilefish have some unique habitat characteristics, and are found in a warm water band (47-651 F) at approximately 250 to 1200 feet deep on the outer continental shelf and upper slope of the U.S. Atlantic coast. Because of their restricted habitat and low biomass, the tilefish fishery in recent years has occurred in a relatively small area in the Mid-Atlantic Bight, south of New England and west of New Jersey. Section 7 consultation was completed on this newly regulated fishery on February 7, 2001 (NOAA Fisheries 2001f). An incidental take statement was provided for loggerhead and leatherback sea turtles, anticipating the annual take of six loggerheads (up to three lethal) and one leatherback (lethal or non-lethal).

It was previously believed that the *Scallop dredge fishery* was unlikely to take sea turtles given the slow speed and location at which the gear operates. However, 40 hard shelled turtles were observed or reported captured in the scallop dredge fishery from 1996 to October 2002. Most of these animals were captured in the Hudson Canyon Closed Area, and 23 of 40 turtles were alive with no apparent injuries. Section 7 consultation was completed on this fishery, and the BO, dated February 24, 2003, concluded that the fishery was not likely to jeopardize listed species (NOAA Fisheries 2003b). The ITS anticipated the annual take of 88 loggerheads (up to 25 lethal), seven Kemp's ridleys (up to two lethal), and one green turtle (lethal or non-lethal) in scallop dredge gear, and one loggerhead, Kemp's ridley, green or leatherback turtle (lethal or non-lethal) in scallop trawl gear. NOAA Fisheries has recently reinitiated consultation on the Atlantic sea scallop fishery following the receipt of Amendment 10 to the FMP from the New England Fishery Management Council (NEFMC), and as a result of more sea turtle takes than previously considered in dredge gear operated outside the Hudson Canyon and Virginia Beach Closed Areas. Research is underway to explore gear technology solutions aimed at reducing turtle interactions.

The *Red crab fishery* is a pot/trap fishery that occurs in deep waters along the continental slope. There have been no recorded takes of ESA-listed species in the red crab fishery. However, given the type of gear used in the fishery, takes may be possible where gear overlaps with the distribution of ESA-listed species. Section 7 consultation was completed on the proposed implementation of the Red Crab FMP, and the BO, issued on February 6, 2002, concluded that the action is not likely to result in jeopardy to any ESA-listed species under NOAA Fisheries jurisdiction (NOAA Fisheries 2002a). Takes of loggerhead and leatherback sea turtles are considered possible. As such, the ITS anticipated the annual take of one loggerhead and one leatherback sea turtle (lethal or non-lethal).

NOAA Fisheries recently completed section 7 consultation on the *skate fishery*. The Northeast skate complex is comprised of seven different related skate species. The seven species of skate are distributed along the coast of the northeast U.S. from the tide line to depths exceeding 700m (383 fathoms). Traditionally, the main gear types used in the skate fishery include mobile otter trawls, gillnet gear, hook and line, and scallop dredges, although bottom trawling is by far the most common gear type, accounting for 94.5% of skate landings. Gillnet gear is the next most common gear type, accounting for 3.5% of skate landings. Although no takes have been observed in the skate fishery, both trawls and gillnets are known to interact with sea turtles. Thus, in the BO for the skate fishery management plan, NOAA Fisheries anticipated that one loggerhead, leatherback, green, or Kemp's ridley sea turtle (one turtle only of any of these four species) may be taken annually in the directed skate fishery (NOAA Fisheries 2003c). However, NOAA Fisheries determined that the skate fishery was not likely to jeopardize the continued existence of any ESA listed species under NOAA Fisheries' jurisdiction.

Components of the *Highly Migratory Species (HMS) Atlantic pelagic fishery for swordfish/tuna/shark/billfish* in the EEZ have occurred within the action area for this consultation. Use of pelagic longline, pelagic driftnet, bottom longline, hand line (including bait nets), and/or purse seine gear in this fishery has resulted in the take of sea turtles and whales.

The Northeast swordfish driftnet portion of the fishery was prohibited during an emergency closure that began in December 1996, extended through May 31, 1997, and was subsequently extended for another six months. An extensive environmental assessment was prepared to evaluate this fishery from both a fisheries and a protected species perspective. The Northeast swordfish driftnet segment was reopened on August 1, 1998, but a final rule to prohibit the use of driftnet gear in the swordfish fishery was published on January 27, 1999 (64 FR 4055). A final rule implementing a new comprehensive FMP for the whole pelagic fishery, which incorporates the driftnet closure, was published on May 28, 1999 (64 FR 29090).

NOAA Fisheries completed the most recent BO on the FMP for the Atlantic HMS fisheries for swordfish, tuna, and shark on June 8, 2001 (NOAA Fisheries 2001e). The BO concluded that the pelagic longline and bottom longline fisheries for shark could capture as many as 1,417 pelagic, immature loggerhead turtles each year and could kill as many as 381 of them. The BO also concluded that these fisheries would be expected to capture 875 leatherback turtles each year, killing as many as 183 of them. After considering the status and trends of populations of these two species of sea turtles, the impacts of the various activities that constituted the baseline, and adding the effects of this level of incidental take in the fisheries, the BO concluded that the Atlantic HMS fisheries, particularly the pelagic longline fisheries, were likely to jeopardize the continued existence of loggerhead and leatherback sea turtles.

The BO outlined one reasonable and prudent alternative, which required NOAA Fisheries to promulgate regulations that close the entire NED area to fishing with pelagic longline gear for US vessels. The BO estimated that this closure would reduce the number of loggerhead and leatherback turtles captured in the fishery by 51% and 49% respectively each year (NOAA Fisheries SEFSC 2001; Yeung et al. 2000). Based on logbook data from 1997-1999, this closure would reduce the number of loggerhead and leatherback turtles captured in the fishery by 76% and 65% respectively, assuming no redistribution of the fishing effort displaced out of the NED. Other elements of the RPA required NOAA Fisheries to promulgate regulations to modify gear used in the pelagic longline fisheries to reduce the likelihood of interactions between the gear and sea turtles and to reduce the probability of sea turtles being injured or killed during any interactions that occurred. After considering the benefits of the measures contained in the RPA, the BO expected that 438 leatherback sea turtles, 402 loggerhead sea turtles, and 35 green, hawksbill, and Kemp's ridley turtles might be captured in the fisheries per year.

4.1.2 Non-Federally Regulated Fishery Operations

Very little is known about the level of take in fisheries that operate strictly in state waters. However, depending on the fishery in question, many state permit holders also hold federal licenses; therefore, section 7 consultations on federal actions in those fisheries address some state-water activity. Impacts on sea turtles from state fisheries may be greater than the impacts from federal activities in certain areas due to the distribution of these species. Impacts of state fisheries on endangered whales are addressed as appropriate through the MMPA take reduction planning process. NOAA Fisheries is actively participating in a cooperative effort with the Atlantic States Marine Fisheries Commission (ASMFC) and member states to standardize and/or implement programs to collect information on level of effort and bycatch of protected species in state fisheries. When this information becomes available, it can be used to refine take reduction plan measures in state waters. Additionally, the June 2001 Strategy for Sea Turtle Conservation and Recovery in Relation to Atlantic Ocean and Gulf of Mexico Fisheries will assess the fishery impacts to turtles on a gear based approach, so this initiative will also better quantify and attempt to minimize sea turtle takes in state water fisheries.

With regard to whale entanglements, vessel identification is occasionally recovered from gear removed from entangled animals. With this information, it is possible to determine whether the gear was deployed by a federal or state permit holder and whether the vessel was fishing in federal or state waters. In 1998, three entanglements of humpback whales in state-water fisheries were documented. Nearshore entanglements of turtles have been documented; however, information is not available on whether the vessels involved were permitted by the state or by NOAA Fisheries.

Leatherbacks have been found entangled in whelk pot lines that are associated with a *whelk fishery* in New England waters. This fishery operates when sea turtles may be in the area. Sea turtles (loggerheads and Kemp's ridleys in particular) are believed to become entangled in the top bridle line of the whelk pot, given a few documented entanglements of loggerheads in whelk pots, the configuration of the gear, and the turtles' preference for the pot contents. Research is underway to determine the magnitude of these interactions and to develop gear modifications to reduce these potential entanglements. Various *crab fisheries* using pot/trap gear also occur in federal and state waters such as horseshoe crab, green crab, blue crab, and Jonah crab. Effort in the latter is currently limited by trap limits set for the lobster fishery since many Jonah crab fishers are also lobster fishers and Jonah crabs are collected using lobster gear. However, there is interest in developing a separate fishery. If the Jonah crab fishery were to develop apart from the lobster fishery, there is a potential for a significant amount of trap/pot gear to be added to the environment. Other gear types occurring in waters within the action area which are known to be an entanglement risk for protected species include a slime eel pot/trap fishery in Northeast waters (*e.g.*, Massachusetts and Connecticut), finfish trap fisheries (*i.e.*, for tautog), and weirs off Cape Cod. Residents in some states (*e.g.*, Connecticut and Massachusetts) may also obtain a personal use lobster license that allows individuals to set traps to obtain lobster for personal use.

4.2 Vessel Activity

4.2.1 Fishing Vessels

Other than entanglement in fishing gear, effects of *fishing vessels* on listed species may involve disturbance or injury/mortality due to collisions or entanglement in anchor lines. Listed species or critical habitat may also be affected by fuel oil spills resulting from fishing vessel accidents. No collisions between commercial fishing vessels and listed species or adverse effects resulting from disturbance have been documented. However, the commercial fishing fleet represents a significant portion of marine vessel activity. For example, more than 280 commercial fishing vessels fish on Stellwagen Bank in the Gulf of Maine. In addition, commercial fishing vessels may be the only vessels active in some areas, particularly in cooler seasons. Therefore, the potential for collisions exists. Due to differences in vessel speed, collisions during fishing activities are less likely than collisions during transit to and from fishing grounds. Because most fishing vessels are smaller than large commercial tankers and container ships, collisions are less likely to result in mortality. Although entanglement in fishing vessel anchor lines has been documented historically, no information is available on the prevalence of such events.

Fuel oil spills could affect animals directly or indirectly through the food chain. Fuel spills involving fishing vessels are common events. However, these spills typically involve small amounts of material that are unlikely to adversely affect listed species. Larger spills may result from accidents, although these events would be rare and involve small areas. No direct adverse effects on listed species or critical habitat resulting from fishing vessel fuel spills have been documented. Given the current lack of information on prevalence or impacts of interactions, there is no basis to conclude that the level of interaction represented by any of the various fishing vessel activities discussed in this section would be detrimental to the recovery of listed species.

4.2.2 Federal Vessel Operations

Potential adverse effects from federal vessel operations in the action area of this consultation include operations of the U.S. Navy (USN) and the U.S. Coast Guard (USCG), which maintain the largest federal vessel fleets, the Environmental Protection Agency (EPA), the National Oceanic and Atmospheric Administration (NOAA), and the ACOE. NOAA Fisheries has conducted formal consultations with the USCG, the USN, and is currently in early phases of consultation with the other federal agencies on their vessel operations (e.g., NOAA research vessels). In addition to operation of ACOE vessels, NOAA Fisheries has consulted with the ACOE to provide recommended permit restrictions for operations of contract or private vessels around whales. Through the section 7 process, where applicable, NOAA Fisheries has and will continue to establish conservation measures for all these agency vessel operations to avoid adverse effects to listed species. At the present time, however, they represent some level of potential interaction. Refer to the biological opinions for the USCG (NOAA Fisheries 1995; July 22, 1996; and NOAA Fisheries 1998c) and the USN (NOAA Fisheries 1997b) for details on the scope of vessel operations for these agencies and conservation measures being implemented as standard operating procedures.

4.2.3 Private and Commercial Vessel Operations

Private and commercial vessels operate in the action area of this consultation and also have the potential to interact with whales and sea turtles. Ship strikes have been identified as a significant source of mortality to the northern right whale population (Kraus 1990) and are also known to impact all other endangered whales. A whale watch enterprise focusing on humpback whales has developed in Massachusetts waters. In addition, an unknown number of private recreational boaters frequent coastal waters; some of these are engaged in whale watching or sportfishing activities. These activities have the potential to result in lethal (through entanglement or boat strike) or non-lethal (through harassment) takes of listed species that could prevent or slow a species' recovery. Effects of harassment or disturbance which may be caused by whale watch operations are currently unknown. Shipping traffic in Massachusetts Bay is estimated at 1,200 ship crossings per year with an average of three per day. Sportfishing contributes more than 20 vessels per day from May to September on Stellwagen Bank in the Gulf of Maine. The presence of the Massachusetts Bay Disposal Site (MBDS), which is located approximately 17 nmi east of Boston Harbor, also accounts for approximately 100 transits per year between dredge sites along the Massachusetts coast and the disposal site (NOAA Fisheries 1999e). The advent of new technology resulting in high-speed catamarans for ferry services and whale watch vessels operating in congested coastal areas contributes to the potential for impacts from privately operated vessels in the environmental baseline. Recent federal efforts regarding mitigating impacts of the whale watch and shipping industries on endangered whales are discussed in Section 4.4 below.

Other than injuries and mortalities resulting from collisions, the effects of disturbance caused by vessel activity on listed species is largely unknown. Although the difficulty in interpreting animal behavior makes studying the effects of vessel activities problematic, attempts have been made to evaluate the impacts of vessel activities such as whale watch operations on whales in the Gulf of Maine. However, no conclusive detrimental effects have been demonstrated.

4.3 Other Activities

A number of anthropogenic activities have likely directly or indirectly affect listed species in the action area of this consultation. These sources of potential impacts include dredging projects, discharge sites and pollution, water quality, and sonic activities. However, the impacts from these activities are difficult to measure. Where possible, conservation actions are being implemented to monitor or study impacts from these elusive sources.

4.3.1 Pollution and Marine Debris

Within the action area, sea turtles and optimal sea turtle habitat most likely have been impacted by pollution. In feeding areas of the northeast such as the Massachusetts Bay area, the dominant circulation patterns make it probable that pollutant inputs into Massachusetts Bay will affect Cape Cod Bay's right whale critical habitat. Sources of pollutants in the Gulf of Maine and other coastal regions include atmospheric loading of pollutants such as PCB's, storm water runoff from coastal cities and towns, runoff into rivers emptying into bays, groundwater discharges and sewage treatment effluent, and oil spills.

Marine debris (e.g., discarded fishing line or lines from boats) can entangle turtles in the water and drown them. Turtles commonly ingest plastic or mistake debris for food, as observed with the leatherback sea turtle. The leatherback's preferred diet includes jellyfish, but similar looking plastic bags are often found in the turtle's stomach contents (Magnuson et al. 1990).

Chemical contaminants may also have an effect on sea turtle reproduction and survival, although the effects of contaminants on turtles are relatively unclear. Pollution has been suggested as a possible contributing factor to the fibropapilloma virus that kills many turtles each year (Aguirre et al. 1994). However, the disease has not yet been linked to any particular contaminant. If pollution is not the causal agent, it may make sea turtles more susceptible to disease by weakening their immune systems.

Excessive turbidity due to coastal development and/or construction sites could influence sea turtle foraging ability. Turtles are not very easily affected by changes in water quality or increased suspended sediments, but if these alterations make habitat less suitable for turtles and hinder their capability to forage, eventually they would tend to leave or avoid these less desirable areas (Ruben and Morreale 1999).

4.3.1.1 Massachusetts Water Resources Authority (MWRA) Outfall Tunnel

A present concern, not yet completely defined, is the possibility of habitat degradation in Massachusetts and Cape Cod Bays due to the MWRA outfall pipe located 9.5 miles east of Deer Island. The MWRA began discharging secondary sewage effluent into Massachusetts Bay in 2000, about 16 miles from designated right whale critical habitat. NOAA Fisheries concluded in a 1993 BO that the discharge of sewage at the MWRA may affect, but is not likely to jeopardize the continued existence of any listed or proposed species or destroy or adversely modify critical habitat under NOAA Fisheries' jurisdiction (NOAA Fisheries 1993). However, scientific uncertainties remain about the potential unforeseen impacts to the marine ecosystem, the food chain, and endangered species. Therefore, post-discharge monitoring is being conducted by the MWRA. The Center for Coastal Studies (CCS), Provincetown, MA has been conducting outfall discharge monitoring studies since May of 2000 to investigate whether habitat degradation in Cape Cod Bay is occurring or if the food chain is being degraded or altered in any way. In a summary report published in January 2003, the CCS reports that at this point in the study, the Cape Cod Bay "appears to be a rich and healthy shallow-water environment that displays the typical variability in characteristics that are found in other similar embayments (Center for Coastal Studies 2003)." However, the study noted a few findings that warranted continued close monitoring of the bays, including 1) detectable levels of sewage fertilizers (as indicated by nitrogen perfusion) along the northwestern portion of Cape Cod Bay as far as 45 km from the effluent during the summer and 80 km in the winter, suggesting that the outfall is to some degree impacting the area, 2) a bloom of the nuisance alga *Phaeocystis pouchetii* in March 2002, suggesting that Cape Cod Bay may be more susceptible to blooms of this species than are the waters of the greater Gulf of Maine, 3) the presence of potentially toxic diatoms of the genus *Pseudo-nitzschia (P. seriata and P. spp.)* during 12 of the 14 months in which sampling took place, warranting close monitoring of Cape Cod Bay phytoplankton, and 4) failure of the usually dominant *Calanus* of the late winter and early spring in 2002, which appears to have cued the early departure of right whales from Cape Cod Bay at a time when, in past years, aggregations of whales were commonly observed. The above-mentioned changes in zooplankton richness and species composition as well as the documented occurrence of toxic and nuisance micro-algae cannot yet be directly attributed to the outfall's products or the spread of the effluent. However, given the potential for the zooplankton species composition to impact right whales and other resources of Cape Cod Bay, these findings warrant continued monitoring of the Bays. (Center for Coastal Studies 2003)

4.3.1.2 Massachusetts Bay Disposal Site (MBDS)

The EPA Region 1 designated the MBDS as an ocean dredged material disposal site in 1993. The site is a two nm diameter area centered at 42°25.1N, 70°35.0W, which is approximately 17 nm east of the entrance to Boston Harbor and adjacent to the boundary of the Stellwagen Bank National Marine Sanctuary. NOAA Fisheries conducted section 7 consultation on the designation of the site for ocean disposal in 1991 (NOAA Fisheries 1991c), and on the EPA/ACOE NAE issued Site Management Plan (SMP) for the MBDS in 1996 (NOAA Fisheries 1996). Biological opinions for both of these consultations concluded that the activities may affect, but would not jeopardize the continued existence of any endangered or threatened species under NOAA Fisheries' jurisdiction. The most recent consultation on the MBDS was reinitiated in 1999 due to new conservation recommendations for large whales, new species information since the original 1993 determination, revised ocean dumping criteria, and updated monitoring programs (NOAA Fisheries 1999e). NOAA Fisheries concluded that the conclusions from previous consultations remained valid based on the continued unknown potential for contaminants to affect protected species. In the SMP, EPA/NAE identified bioaccumulation and biomagnification of contaminants into the food chain as the most important monitoring concern at the MBDS (EPA/NAE 1996). Although no adverse impacts have been discovered thus far, the EPA and ACOE continue to monitor the impacts of the disposal site through the Disposal Area Monitoring System (DAMOS) tiered monitoring approach, which uses benthic recolonization and sediment quality as indicators that disposal operations are meeting the prescribed regulations.

4.3.2 Anthropogenic Noise

NOAA Fisheries and the U.S. Navy have been working cooperatively to establish a policy for monitoring and managing acoustic impacts on marine mammals from anthropogenic sound sources in the marine environment. Acoustic impacts can include auditory trauma, temporary or permanent loss of hearing sensitivity, habitat exclusion, habituation, and disruption of other normal behavior patterns such as feeding, migration, and communication. It is expected that the policy on managing anthropogenic sound in the oceans will provide guidance for programs such as the use of acoustic deterrent devices in reducing marine mammal-fishery interactions and review of federal activities and permits for research involving acoustic activities.

4.4 Conservation and Recovery Actions Reducing Threats to Listed Species

4.4.1 Reducing threats to listed whales

In addition to the ESA measures for federal activities mentioned in the previous section, numerous recovery activities are being implemented to decrease the adverse effects of private and commercial vessel operations on the species in the action area and during the time period of this consultation. These include the Atlantic Large Whale Take Reduction Plan (ALWTRP), Sighting Advisory System (SAS), other activities recommended by the Northeast Recovery Plan Implementation Team for the Right and Humpback Whale Recovery Plans (NEIT) and Southeast Recovery Plan Implementation Team for the Right Whale Recovery Plan (SEIT), and NOAA Fisheries regulations.

4.4.1.1 Atlantic Large Whale Take Reduction Plan

The MMPA requires NOAA Fisheries to develop a plan to reduce mortalities and serious injuries to marine mammals incidentally taken in commercial fisheries to levels less than the potential biological removal (PBR), approaching a zero mortality and serious injury rate. The Atlantic Large Whale Take Reduction Plan (ALWTRP) was developed to meet this requirement of the MMPA. It primarily focuses on right whales, but is also expected to reduce entanglements of humpback, fin, and minke whales. The benefits to humpback, fin and minke whales may be limited because the plan concentrates on right whale distribution to determine area closures, but many gear modifications are required fishery-wide. In general, humpback whales inhabit northern waters at the same time as right whales but the spatial overlap may depend on prey distribution. As a result of right whale entanglement events over the past four or five years, NOAA Fisheries has developed and has continued to revise the ALWTRP with additional gear regulations. The ALWTRP applies to gillnet and lobster trap/pot gear.

The regulatory component of the ALWTRP includes a combination of broad fishing gear modifications and time-area restrictions supplemented by progressive gear research to reduce the chance that entanglements will occur, or that whales will be seriously injured or die as a result of an entanglement. The ALWTRP is a "work-in-progress", and revisions are made to the regulations as new information and technology becomes available. Recent changes to the ALWTRP regulations included SAM (Interim Final Rule) effective March 1, 2002, DAM (Final Rule) effective February 11, 2002, and a range of additional gear modifications affecting lobster gear in NE and Mid-Atlantic (effective February 11, 2002) and restrictions on gillnets in the South Atlantic (effective October 23, 2002). The latest update to the ALWTRP included a modification to the DAM program in which NOAA Fisheries identified anchored gillnet and lobster trap/pot gear modifications that could be allowed within a DAM zone (effective September 25, 2003). Because gear entanglements of right, humpback, fin, and minke whales have continued to occur, including serious injuries and mortality, new and revised regulatory measures are anticipated. These changes are made with the input of the Atlantic Large Whale Take Reduction Team (ALWTRT), which is comprised of representatives from federal and state government, the fishing industry, and conservation organizations.

The non-regulatory component of the ALWTRP is composed of four principal parts: (1) gear research and development, (2) disentanglement, (3) the Northeast Implementation Team, and (4) the Sighting Advisory System. These components of the ALWTRP address both fishing gear entanglements and ship strikes; the two primary anthropogenic causes of right whale mortality. These are discussed further below.

Gear research and development is a critical component of the ALWTRP, with the aim of finding new ways of reducing the number and severity of marine mammal-gear interactions while allowing for fishing activities. The gear research and development program follows two approaches: (a) reducing the number of lines in the water without shutting down fishery operations, and (b) devising lines that are weak enough to allow whales to break free and at the same time strong enough to allow continued fishing. This aspect of the ALWTRP is also important in that it incorporates the knowledge and participation of the fishing industry for developing and testing modified and experimental gear.

In recent years, NOAA Fisheries has increased funding for the Whale Disentanglement Network; purchasing equipment caches to be located at strategic spots along the Atlantic coastline, supporting training for fishers and biologists, purchasing telemetry equipment, etc. This has resulted in an expanded capacity for disentanglement along the Atlantic seaboard including offshore areas. The Center for Coastal Studies (CCS), under NOAA Fisheries authorization, has responded to numerous calls since 1984 to disentangle whales entangled in gear, and has developed considerable expertise in whale disentanglement. NOAA Fisheries has supported this effort financially since 1995. Memoranda of Understanding developed with the USCG ensure its participation and assistance in the disentanglement effort. Hundreds of Coast Guard and Marine Patrol workers have received training to assist in disentanglements. As a result of the success of the disentanglement network, NOAA Fisheries believes that many whales that may otherwise have succumbed to complications from entangling gear have been freed and survived the ordeal.

In 1994, NOAA Fisheries established the NEIT for the North Atlantic right whale and humpback whale recovery plans. Membership of the NEIT consists of representatives from federal and state regulatory agencies and is advised by a panel of scientists with expertise in right and humpback whale biology. The Recovery Plans describe steps to reduce impacts to levels that will allow the two species to recover and rank the various recovery actions in order of importance. The NEIT provides advice to the various federal and state agencies or private entities on achieving these national goals within the Northeast Region. The NEIT agreed to focus on habitat and vessel related issues and rely on the take reduction planning process under the MMPA for reducing takes in commercial fisheries. Through the deliberations of the NEIT, NOAA Fisheries has implemented a number of activities that reduce the potential for adverse effects to endangered whales from the aforementioned state, federal, and private activities. For example, the NEIT was the driving force behind the outreach activities described above which promote awareness of the right whale ship strike problem among commercial ship operators.

The Northeast Sighting Advisory System (SAS), originally called the Early Warning System, was designed to document the presence of right whales in and around critical habitat and nearby shipping/traffic separation lanes in order to avert ship strikes. Through a fax-on-demand system, fishermen and other vessel operators can obtain SAS sighting reports and, in some cases, make necessary adjustments in operations to decrease the potential for interactions with right whales. The SAS activity has also served as the only form of active entanglement monitoring in the critical habitat areas, and several entanglements in both the Cape Cod Bay and Great South Channel areas have been reported by SAS flights. Some of these sighting efforts have resulted in successful disentanglement of right whales. SAS flights have also contributed to sightings of dead floating animals that can occasionally be retrieved to increase our knowledge of the biology of the species and effects of human impacts.

In April 1998, the USCG submitted, on behalf of the United States, a proposal to the International Maritime Organization (IMO) requesting approval of a mandatory ship reporting system (MSR) in two areas off the east coast of the United States. The system requires that when ships greater than 300 gross tons enter these important right whale habitats, they must report their course, location, speed, destination, and route to a shore-based station. The ship then receives information about right whales, their vulnerability to ship strikes, measures the ship can take to avoid collisions, and locations of recent right whale sightings. The USCG worked closely with NOAA Fisheries and other agencies on technical aspects of the proposal. The package was submitted to the IMO's Subcommittee on Safety and Navigation for consideration and submission to the Marine Safety Committee at IMO and approved in December 1998. The USCG and NOAA play important roles in helping to operate the MSR system, which was implemented on July 1, 1999.

Through deliberations of the NEIT and its Ship Strike Committee, NOAA Fisheries and the National Ocean Service (NOS) recently revised the whale watch guidelines for the Northeast, including the Studds-Stellwagen National Marine Sanctuary.

4.4.1.2 Regulatory Measures

The Recovery Plan for the North Atlantic Right Whale identified anthropogenic disturbance as one of many factors that had some potential to impede right whale recovery (NOAA Fisheries 1991b). In one recovery action aimed at reducing vessel-related impacts, including disturbance, NOAA Fisheries published a proposed rule in August 1996 restricting vessel approach to right whales (61 FR 41116) to a distance of 500 yards. Following public comment, NOAA Fisheries published an interim final rule in February 1997 codifying the regulations. With certain exceptions, the rule prohibits both boats and aircraft from approaching any right whale closer than 500 yds. Exceptions for closer approach are provided for the following situations: when (a) compliance would create an imminent and serious threat to a person, vessel, or aircraft; (b) a vessel is restricted in its ability to maneuver around the 500-yard perimeter of a whale; (c) a vessel is investigating or involved in the rescue of an entangled or injured right whale; or (d) the vessel is participating in a permitted activity, such as a research project. If a vessel operator finds that he or she has unknowingly approached closer than 500 yds, the rule requires that a course be steered away from the whale at slow, safe speed. In addition, all aircraft, except those involved in whale watching activities, are excepted from these approach regulations. This rule is expected to reduce the potential for vessel collisions and other adverse vessel-related effects in the environmental baseline.

Lobster and gillnet gear are known to entangle endangered large whales. Regulations introduced in Massachusetts waters requiring modifications to lobster and gillnet fishing came into effect January 1, 2003. The purpose of the new requirements is to reduce the risk of right whale entanglements in an area that has a known congregation of right whales each year. From January 1 through April 30, single lobster pots are banned, and ground lines must be either sinking or neutrally buoyant. Buoy lines must also be mostly sinking line and must include a weak link. From May 1 through December 31, lobstermen must use at least two of the following gear configurations: buoy lines 7/16-inch diameter or less, a weak link at the buoy of 600 pounds breaking strength, sinking buoy lines, and sinking or neutrally buoyant ground lines.

4.4.1.3 Education and Outreach Activities

A number of activities are in progress that ameliorate some of the adverse effects on listed species posed by activities summarized in the Environmental Baseline. Education and outreach activities are considered one of the primary tools to reduce the threats to all protected species. NOAA Fisheries has been active in public outreach to educate fishermen regarding sea turtle handling and resuscitation techniques. For example, NOAA Fisheries has conducted workshops with longline fishermen to discuss bycatch issues including protected species, and to educate them regarding handling and release guidelines. NOAA Fisheries intends to continue supplementing outreach efforts in an attempt to increase the survival of protected species through education on proper release techniques. Education and outreach activities are also methods to reduce the risk of collision presented by the operation of private and commercial vessels. The USCG educates mariners on whale protection measures and uses its programs -- such as radio broadcasts and notice to mariner publications -- to alert the public to potential whale concentration areas. The USCG also participates in international activities (discussed below) to decrease the potential for commercial ships to strike a whale. Recently, an educational video on the ship strike problem was produced and is being distributed to mariners. In addition, outreach efforts under the ALWTRP for fishermen are also increasing awareness among fishermen that is expected in the long run to help reduce the adverse effects of vessel operations on threatened and endangered species in the action area.

4.4.2 Reducing threats to listed sea turtles

4.4.2.1 Sea turtle handling and resuscitation techniques

NOAA Fisheries has also developed specific sea turtle handling and resuscitation techniques for sea turtles that are incidentally caught during scientific research or fishing activities to prevent injury. The Sea Turtle Handling and Resuscitation Techniques are regulations which were published (revised) in the Federal Register on December 31, 2001. As stated in 50 CFR 223.206(d)(1), any sea turtle taken incidentally during fishing or scientific research activities must be handled with due care to prevent injury to live specimens, observed for activity, and returned to the water according to a series of procedures.

4.4.2.2 Sea Turtle Stranding and Salvage Network (STSSN)

While this does not refer to a specific regulation, there is an extensive array of Sea Turtle Stranding and Salvage Network (STSSN) participants along the Atlantic and Gulf of Mexico coasts who not only collect data on dead sea turtles, but also rescue and rehabilitate live stranded turtles. Data collected by the STSSN are used to monitor stranding levels and compare them with fishing activity in order to determine whether additional restrictions on fishing operations are needed. These data are also used to monitor incidence of disease, study toxicology and contaminants, and conduct genetic studies to determine population structure. All of the states that participate in the STSSN are collecting tissue for and/or conducting genetic studies to better understand the population dynamics of sea turtle species. These states also tag live turtles when encountered (either via the stranding network through incidental takes or in-water studies). Tagging studies help provide an understanding of sea turtle movements, longevity, and reproductive patterns, all of which contribute to our ability to reach recovery goals for the species.

There is no organized, formal program for at-sea disentanglement of sea turtles as there is for cetaceans. However, NOAA Fisheries is considering disentanglement guidelines pursuant to conservation recommendations issued with several recent section 7 consultations. Entangled sea turtles found at sea in recent years have been disentangled by STSSN members, the whale disentanglement team, the USCG, and fishermen. Staff of the Maine Department of Marine Resources (DMR) has received anecdotal reports from fishermen who have disentangled leatherbacks from their lobster pot gear (J. Lewis, pers. comm.).

4.5 Summary and Synthesis of the Status of the Species and Environmental Baseline

In summary, endangered and threatened whales and sea turtles in the vicinity of the NOMES I site may be affected by several ongoing activities in the action area for this consultation, including vessel operations, military activities, commercial and state fisheries, and pollution. However, recovery actions have been undertaken as described and continue to evolve. Although these recovery actions have not been in place long enough to manifest detectable changes in most endangered or threatened populations, they are expected to benefit listed species in the foreseeable future. The recovery actions should not only improve conditions for listed whales and sea turtles, they are expected to reduce sources of human-induced mortality as well.

However, a number of factors in the existing baseline for the large whales considered in this BO (especially right whales), and sea turtles (especially loggerheads and leatherbacks) leave cause for considerable concern regarding the status of these populations, the current impacts upon these populations, and the impacts associated with future activities planned by the state and federal agencies.

- The North Atlantic right whale population continues to be declining. Based on recent estimates, NOAA Fisheries considers the best approximation for the number of North Atlantic right whales to be 300 +/- 10%. Losses of adult whales due to ship strikes and entanglements in fishing gear continue to depress the recovery of this species.

- The population of leatherback sea turtles in the Atlantic Ocean does not appear to be increasing; it is either declining or stable depending on whether we accept conservative or optimistic estimates, respectively.

- The northern subpopulation of loggerhead sea turtles is stable, at best, or declining, and currently numbers only about 3,800 nesting females. The percent of northern loggerheads represented in sea turtle strandings in northern U.S. Atlantic states is over-representative of their total numbers in the overall loggerhead population. Current take levels from other sources, particularly fisheries, are high.

5.0 EFFECTS OF THE ACTION

This section of a biological opinion assesses the direct and indirect effects of the proposed action on threatened and endangered species or critical habitat, together with the effects of other activities that are interrelated or interdependent (50 CFR 402.02). Indirect effects are those that are caused later in time, but are still reasonably certain to occur. Interrelated actions are those that are part of a larger action and depend upon the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration (50 CFR 402.02).

NOAA Fisheries has determined that bottom trawling and gillnetting at the NOMES I borrow site off Winthrop, MA may affect threatened and endangered species in three ways: (1) bottom trawling can alter foraging habitat; (2) bottom trawls can capture and entangle sea turtles; (3) sea turtles and whales can be injured or killed by entanglement in gillnets; and (4) sea turtles and whales can be affected by interactions with vessels.

5.1 Species Presence in the Action Area

Several listed species are likely to be present in the action area at various times of the year and may therefore be affected either directly or indirectly by the bottom trawling and gillnetting portions of the proposed biological sampling and monitoring protocol. The primary concern for sea turtles is capture and entanglement in the bottom trawl and gillnets, while the main concern for endangered whales involves entanglement in gillnets only.

Sea turtles forage in shallow harbors and embayments in northeast waters during the warmer months, generally from June through October in Massachusetts waters. Kemp's ridley, leatherback, and loggerhead sea turtles are the most common turtle species in Massachusetts waters. Although green turtles are not as common in Massachusetts waters as Kemp's ridley, loggerhead, or leatherback sea turtles, they have been documented occasionally in Massachusetts waters and as such, NOAA Fisheries considers them to be present in the action area. Hawksbill turtles are not considered regular visitors to Massachusetts waters, and their presence in the action area would be extremely rare. Therefore, NOAA Fisheries considers that hawksbill sea turtles are not likely to be adversely affected by the proposed sampling and monitoring activities.

To some extent, the number of sea turtles occurring in a particular area is dictated by water depth. Water depth at the borrow site ranges from approximately 80-90 ft deep. Satellite tracking studies of sea turtles in the Northeast found that turtles mainly occurred in areas where the water depth was between approximately 16 and 49 ft (Ruben and Morreale 1999). This depth was interpreted not to be as much an upper physiological depth limit for turtles, as a natural limiting depth where light and food are most suitable for foraging turtles (Standora et al. 1990). Sea turtles are capable of dives to substantial depths (300-1000 m; Eckert et al. 1986 in Stabenau et al. 1991), and chelonid turtles have been found to make use of deeper, less productive channels as resting areas that afford protection from predators because of the low energy, deep water conditions. Leatherbacks have been shown to dive to great depths, often spending a considerable amount of time on the bottom (NOAA Fisheries 1995). Therefore, although the depth at the NOMES I site may not be optimal for foraging, sea turtles may still transit the action area while moving into or out of more suitable foraging environments, or may be resting on or near the bottom.

There has been little directed survey effort to assess sea turtle abundance in the vicinity of the NOMES I site. Observer data collected during 17 days of water quality surveys near the MWRA outfall pipe in 1997 reported no sea turtle sightings; however, sea turtles are difficult to spot from surface vessels, and these data cannot be interpreted to mean that sea turtles were not present (Wennemer et al. 1998). Sea turtles have stranded along the coast throughout Massachusetts and Cape Cod Bays, and therefore it is reasonable to conclude that sea turtles are present in the action area.

Endangered whales could also migrate through the action area at various times of the year. North Atlantic right, humpback and fin whales have all been sighted in Massachusetts Bay waters, although sightings in the immediate vicinity of the NOMES I site have been rare (NOAA Fisheries NEFSC unpublished data 2002). In general, right whales can be anticipated to be in Massachusetts and Cape Cod Bays from December through July, humpback whales can be found in Massachusetts waters year-round, with peaks between May and August, and fin whales may be in Massachusetts waters year-round, with peaks during the summer months (although they are generally found further offshore than the action area for this consultation). Neither of the right whale critical habitat designations in Massachusetts waters coincides with the NOMES I site; however, the NOMES I site is 17 nautical miles northwest of the Cape Cod Bay critical habitat. Although right whale sightings are concentrated in the critical habitat areas, the Gulf of Maine serves as an important spring and summer nursery/feeding area. Therefore, right whales may be transiting near the NOMES I borrow site.

While the proposed sampling and monitoring activities are scheduled to take place year-round, this BO considers the effects of bottom trawling and gillnetting on sea turtles and other listed species during the times when they occur in the action area.

5.2 Effects of Bottom Trawling

Bottom trawls are typically cone-shaped nets that are towed along the sea bottom. Large, rectangular doors attached to the two cables keep the net open while deployed. At the bottom of an otter trawl mouth is the footrope or ground rope that can bear many heavy (tens to hundreds of kilograms) steel weights (bobbins) that keep the trawl on the seabed. In addition, bottom trawls may be constructed with large (up to 40 cm diameter) rubber discs or steel bobbins (rockhoppers) that ride over structures such as boulders and coral heads that might otherwise snag the net. Some trawls are constructed with tickler chains that disturb the seabed to flush shrimp or fishes into the water column to be caught by the net. The constricted posterior netting of a trawl is called the cod end.

5.2.1 Alteration of foraging habitat

Bottom trawls are dragged along the bottom of the sea floor, and can thus disturb the benthic habitat and cause indirect effects to sea turtles by reducing the numbers or altering the composition of the species upon which sea turtles prey. Turtles are not very easily affected by changes in water quality, increased suspended sediments, or even by moderate alterations of flow regimes. Nevertheless, if these changes make the habitat less suitable for turtles, in the long run sea turtles would tend to leave or avoid these less desirable areas, especially if they became food limited (Ruben and Morreale 1999).

The loss of foraging habitat could be especially detrimental to sea turtles because these species primarily enter Northeast shallow harbors and bays to forage (NOAA Fisheries and USFWS 1995). However, there is no information to indicate that unique concentrations of preferred prey or better foraging habitat exist at the NOMES I site as opposed to neighboring areas. Water depth at the NOMES I site (80-90 ft) is much deeper than optimal foraging habitat for turtles (16-49 ft). Therefore, although not enough is known about the resources at the NOMES I site to exclude the possibility that turtles may forage there, it can be assumed that sea turtles are not likely to be more attracted to the NOMES I site than to other foraging areas and should be able to find sufficient prey in alternate areas. Even if prey items are available at the NOMES I site, it is important to note that some of the prey species targeted by turtles are mobile and are likely to avoid the trawl or quickly repopulate the area from surrounding areas once the tow is complete. Thus, while available foraging habitat may be reduced temporarily, long-term effects to listed species' benthic prey are expected to be minimal.

Similarly, the bottom trawl is expected to remove fish from the project area, some of which may be prey items for humpback and fin whales. However, concentrations of whales have not been observed in the project area, suggesting that the area does not serve as a primary feeding ground for these whales. In addition, the density of fish removed during 11 days of limited sampling activity (ten, ten-minute tows) is not likely to impact the availability of prey resources for humpback and fin whales. Right whales feed primarily on plankton species, which are not likely to be affected by the bottom trawling activity.

Based on the above information, NOAA Fisheries anticipates that the bottom trawling at the NOMES I site is not likely to disrupt normal sea turtle or whale feeding behaviors and is not likely to remove critical amounts of prey resources from the Massachusetts Bay.

5.2.2 Effects of Bottom Trawls on Sea Turtles

The National Research Council's (NRC) Committee on Sea Turtle Conservation (1990) estimated that fishery interactions, particularly incidental captures in shrimp trawls, are the primary source of anthropogenic mortality of sea turtles. Forced submergence due to capture and entanglement are the most imminent dangers for sea turtles during bottom trawling operations because sea turtles that are caught in bottom trawl nets may subsequently drown. As turtles rest, forage, or swim on or near the bottom, trawls pulled across the bottom can sweep over and capture them. Sea turtles are air-breathing reptiles and, although they are able to conduct lengthy voluntary dives, if they are captured in a trawl and are unable to surface, they will eventually die. Sea turtles forcibly submerged in any type of restrictive gear eventually suffer fatal consequences from prolonged anoxia and/or seawater infiltration of the lung (Lutcavage and Lutz 1997). A study examining the relationship between tow time and sea turtle mortality showed that mortality was strongly dependent on trawling duration, with the proportion of dead or comatose turtles rising from 0% for the first 50 minutes of capture to 70% after 90 minutes of capture (Henwood and Stuntz 1987). However, metabolic changes that can impair a sea turtle's ability to function can occur within minutes of a forced submergence. While most voluntary dives appear to be aerobic, showing little if any increases in blood lactate and only minor changes in acid-base status, the story is quite different in forcibly submerged turtles—oxygen stores are rapidly consumed, anaerobic glycolysis is activated, and acid-base balance is disturbed, sometimes to lethal levels (Lutcavage and Lutz 1997).

Forced submergence of Kemp's ridley sea turtles in shrimp trawls resulted in an acid-base imbalance after just a few minutes (times that were within the normal dive times for the species) (Stabenau et al. 1991). Conversely, recovery times for acid-base levels to return to normal may be prolonged. Henwood and Stuntz (1987) found that it took as long as 20 hours for the acid-base levels of loggerhead sea turtles captured in shrimp trawls for less than 30 minutes to return to normal. This effect is expected to be worse for sea turtles that are recaptured before metabolic levels have returned to normal. Physical and biological factors that increase energy consumption, such as high water temperatures and increased metabolic rates characteristic of small turtles, would be expected to exacerbate the harmful effects of forced submergence from trawl capture (NRC 1990).

NOAA Fisheries has implemented a series of regulations aimed at reducing the potential for incidental mortality of sea turtles in commercial trawl fisheries. In particular, NOAA Fisheries has required the use of turtle excluder devices (TEDs) in southeast U.S. shrimp trawls since 1989 and in summer flounder trawls in the mid-Atlantic area (south of Cape Henry, Virginia) since 1992. It has been estimated that TEDs exclude 97% of the turtles caught in such trawls. Although the use of TEDs is often effective in minimizing the number of turtles captured in trawl nets, the purpose of the current action is to characterize the biological resources at the NOMES I site and assess the suitability of the site for dredging activity. Since dredging is known to affect sea turtles, the presence of sea turtles at the NOMES I site insofar as can be determined through opportunistic capture would be valuable information in assessing the impact of future dredging at the site. Therefore, the use of TEDs is not preferred for the current activity, and as a result, sea turtles could be captured during trawling at the NOMES I site.

The short tow times (ten minutes) associated with the sampling and monitoring activities under the current consultation are likely to minimize the amount of lethal take expected from bottom trawling at the NOMES I site. However, a small percentage of turtles captured live by trawls may die or suffer injury during trawling, while on deck, or after release, particularly if the animals involved have been previously stressed or are diseased or unhealthy. On November 3, 2002, during relocation trawling conducted in York Spit Channel (with 15-30 minute tows), a Kemp's ridley sea turtle was recovered. The fresh dead turtle was bleeding with wounds to the head (REMSA 2002a). The Virginia Marine Science Museum (VMSM) conducted a necropsy and concluded that the animal appeared to be a healthy, fresh dead juvenile Kemp's ridley with the only noted abnormalities to the head (REMSA 2002b), which suggested that the cause of death was likely trawl-related. In addition, out of 47 incidental turtle takes during bottom trawl surveys conducted by the NOAA Fisheries NEFSC since 1979 (two surveys per year, approximately 300 tows per survey), there was one documented loggerhead mortality, in which the animal fell out of the net onto the deck. Although these two incidents demonstrate that turtles can die as a result of interactions with bottom trawls, they represent a very limited number of lethal takes during trawl tows of short duration compared to the number of successful live captures (two lethal takes out of more than 80 live captures in both NEFSC surveys and relocation trawling). NOAA Fisheries thus believes that the trawl survey is not reasonably likely to result in sea turtle mortality.

Nonetheless, the capture of live, uninjured turtles would also be considered a take under the ESA. Due to the known interaction between bottom trawls and sea turtles and the known seasonal presence of sea turtles in Massachusetts waters, NOAA Fisheries concludes that the trawling associated with the proposed action is reasonably likely to result in the capture of a small number of live sea turtles. The level of take expected will be discussed in section 5.5 below.

5.2.3 Effects of Bottom Trawls on Marine Mammals

Given their large size and mobility, right, humpback, and fin whales are not expected to be caught in bottom trawl gear. The North Atlantic Bottom Trawl fisheries are listed as Category III fisheries in the 2003 List of Fisheries for the taking of marine mammals by commercial fishing operations under section 118 of the Marine Mammal Protection Act (MMPA). Category III fisheries are those for which there is information indicating a "remote likelihood" of incidental taking of a marine mammal in the fishery or, in the absence of information indicating the frequency of incidental taking of marine mammals, other factors such as fishing techniques, gear used, methods used to deter marine mammals, target species, seasons and areas fished, and species distribution of marine mammals in the area suggest there is a "remote likelihood" of an incidental take in the fishery. There have been no recorded interactions between ESA-listed marine mammals and bottom trawls in the Northeast.

5.3 Effects of Gillnets

Gillnets are panels of net anchored in some form with a top rope, referred to as the head rope or floating line, and a bottom rope, referred to as the lead line. As the name implies, floats are attached to floating line while the lead line is weighted to help maintain the vertical profile of the gillnet in the water column. Multiple net panels are typically attached together in series to form a net-string. Buoy lines attached to each end of a net string rise to the surface to mark the location of the gear. Gillnets fish by presenting a wall of netting in which fish are incidentally snagged or entangled.

5.3.1 Effects of gillnets on sea turtles

Gillnet gear poses a risk to all four turtle species found in the action area (leatherback, loggerhead, Kemp's ridley and green). Records of stranded or entangled sea turtles reveal that fishing line can wrap around the neck, flipper, or body of the sea turtle and severely restrict swimming or feeding (Balazs 1985). A sea turtle that encounters gillnet gear may become snagged or caught up in the netting. Gillnets are so effective at catching sea turtles, they were commonly used in the historical sea turtle fishery. Drowning may occur immediately as a result of forced submergence or at a later time if trailing gear becomes lodged between rocks and ledges below the surface. When entanglement occurs, available oxygen decreases, allowing anaerobic glycolysis to take over and producing high levels of lactic acid in the blood (Lutcavage and Lutz 1997). Leatherbacks may be more susceptible to drowning than other sea turtles due to their unusual physiology and metabolic processes. Leatherbacks lack calcium, which aids in the neutralizing of lactic acid that builds up by increasing bicarbonate levels. In addition, long pectoral flippers along with extremely active behavior make leatherback sea turtles especially defenseless to any type of ocean debris. Anecdotal evidence indicates that when leatherbacks encounter vertical line or buoy line, they may swim in circles resulting in multiple wraps around a flipper. The softer epidermal tissue of leatherbacks may also make them more susceptible to serious injuries from entangling gear.

In the proposed sampling protocol, gillnetting is an optional technique should bottom conditions prohibit effective use of the bottom trawl. In addition, gillnetting is only scheduled to occur once monthly between October and February, and will overlap with sea turtle presence in the action area only during October. Therefore, sea turtles in the vicinity of the NOMES I site would be exposed to only one day (six hours) of gillnetting activity. The presence of the vessel on site throughout the set duration, the presence of an endangered species observer, and the practice of hauling the nets when sea turtles are spotted in the area are expected to further reduce the impacts of gillnetting on sea turtles. However, sea turtles are difficult to spot even with a qualified, dedicated observer on board. As such, it is reasonably likely that a submerged sea turtle could encounter the gillnet undetected by the observer. As discussed above, once a sea turtle encounters the net, it is likely to thrash and become entangled in the gillnet. During a six hour set, the entangled turtle is likely to remain submerged long enough to deplete its oxygen stores, and would likely drown. Therefore, adverse impacts to sea turtles from the gillnetting portion of the sampling and monitoring protocol are still reasonably likely to occur during the short period when gillnetting activity coincides with sea turtle presence in the action area. The number of expected takes will be discussed in section 5.5 below.

5.3.2 Effects of Gillnets on Marine Mammals

Gillnets pose an entanglement risk to whales just as they do to sea turtles. Whales can and do become entangled in the buoy lines or the anchor lines of the gillnets, and may also become entangled in the net panels. A whale that encounters the vertical "wall" of the gillnet may become wrapped in the net if it thrashes in its attempt to get away from the gear. It is surmised that when the whale encounters a line, it may move along that line until it comes up against something such as a buoy. The buoy can then be caught in the baleen (in the case of baleen or mysticete whales), against a flipper or on some other body part. When the animal feels the resistance of the gear, it likely thrashes, which may cause it to become entangled in the lines. For large whales, there are generally three areas of entanglement: 1) the gape of the mouth, 2) around the flippers, and 3) around the tail stock. If the line is attached to gear too heavy for the whale, drowning may result. But many whales have been observed swimming with portions of the line, with or without the fishing gear, wrapped around a pectoral fin, the tail stock, the neck or the mouth.

Factors which appear to influence a whale's susceptibility to gear entanglements are the species' physical characteristics (i.e., baleen whales versus toothed whales) and habitat. Polypropylene (floating) lines between the buoy line and anchor line have been identified as a serious entanglement risk to large whales. Floating line can become entangled in baleen when the animal is moving through the water with the mouth gaped for feeding. Knots in the line further hinder the ability of the line to pass through the baleen. In addition, anchors on the gear offer resistance against which the whale may struggle and result in further entanglement of the fishing gear across the mouth and/or body of the whale.

The depth at which whales feed may also influence their risk for entanglement. Evidence exists that right whales feed on zooplankton through the water column (to a depth of 600 feet or more), and in shallow waters may feed near the bottom. This is relevant in that sink gillnets, such as the type proposed for use in the current action, are fished on the bottom. Therefore, because of their method of feeding and their overlap with the sink gillnet fishery, right whales appear susceptible to entanglement in both the float lines and nets of sink gillnet gear, and to be more susceptible to such gear than other species of whales.

The Northeast Sink Gillnet fishery is listed as a Category I fishery in the 2003 List of Fisheries for the taking of marine mammals by commercial fishing operations under section 118 of the MMPA due to documented information indicating a "frequent" incidental mortality and injury of marine mammals, including ESA-listed whales, in the fishery.

As with sea turtles, the short set duration associated with the sampling protocol (six hours maximum), the presence of the vessel on site throughout the set duration, the presence of an endangered species observer, and the practice of hauling the nets when whales are spotted in the area are expected to reduce the impacts of gillnetting on listed whales. In addition, observed gillnet trips between 2000-2002 revealed no incidents involving large whales in Massachusetts Bay, and no interactions with any marine mammal within the immediate vicinity of the NOMES I site. Nonetheless, NOAA Fisheries recognizes that a submerged whale may not be detected by the observer, and therefore entanglement in the gillnet remains a possibility. Accordingly, the ACOE and DUPR have agreed, through correspondence with NOAA Fisheries staff, to consult the SAS to obtain the latest information on right whale sightings and delay activities accordingly, and implement all applicable ALWTRP measures to minimize the entanglement risk to any whale that might encounter the gillnet gear. Observation data collected during MWRA water quality surveys from 1998-2002 suggest that the number of large whale sightings in the vicinity of the NOMES I site is low relative to the number of sightings in other portions of the Massachusetts and Cape Cod Bays (14 large whale sightings in five years during approximately 136 hours of effort per year; 9% of total sightings during five years of observation in Massachusetts and Cape Cod Bays; McLeod et al. 2003). NEFSC data indicate only two large whale sightings in the vicinity of the NOMES I site—one right whale was seen in 1996 and one in 2002. Due to the importance of the Massachusetts and Cape Cod Bays as feeding grounds for right, humpback, and fin whales, dedicated survey effort in these areas is high. The Sighting Advisory System also provides opportunistic sighting data in the critical habitat areas and surrounding waters. Therefore, although it is possible that a right, humpback or fin whale could transit near the NOMES I site, reliable data exist that suggest this would be an unlikely occurrence. Gillnetting is also scheduled between October and February, the period during which right, humpback, and fin whale presence in the action area is expected to be lowest. Therefore, considering the low probability of encountering endangered whales in the action area, the low level of gillnetting effort (maximum 30 hours of total effort), and the mitigation measures proposed, NOAA Fisheries concludes that right, humpback, and fin whales are not likely to be adversely affected by the gillnetting activity at NOMES I.

5.4 Collisions with vessels

As noted in the species accounts above, vessel collisions represent a significant anthropogenic threat to endangered and threatened species in the action area. Although more than 280 commercial fishing boats fish on Stellwagen Bank, no collisions with marine mammals or sea turtles have been reported. Nonetheless, it is possible that collisions are occurring without being detected or reported. During the sampling activities, the vessel will only be moving at 2.5 knots, which is unlikely to pose a threat to marine mammals or sea turtles. However, the vessel will be moving at speeds up to ten knots while in transit to and from the NOMES I site.

5.4.1 Effects of vessel collisions on sea turtles

Interactions between vessels and sea turtles occur and can take many forms, from the most severe (death or bisection of an animal or penetration to the viscera), to severed limbs or cracks to the carapace which can also lead to mortality directly or indirectly. Sea turtle stranding data for the

U.S. Gulf of Mexico and Atlantic coasts, Puerto Rico, and the U.S. Virgin Islands show that between 1986 and 1993, about 9% of living and dead stranded sea turtles had propeller or other boat strike injuries (Lutcavage et al. 1997). According to 2001 STSSN stranding data, at least 33 sea turtles (loggerhead, green, Kemp's ridley and leatherbacks) that stranded on beaches within the northeast (Maine through North Carolina) were struck by a boat. This number underestimates the actual number of boat strikes that occur since not every boat struck turtle will strand, every stranded turtle will not be found, and many stranded turtles are too decomposed to determine whether the turtle was struck by a boat. It should be noted, however, that it is not known whether all boat strikes were the cause of death or whether they occurred post-mortem (NOAA Fisheries SEFSC 2001).

Information is lacking on the type or speed of vessels involved in turtle vessel strikes. However, there does appear to be a correlation between the number of vessel struck turtles and the level of recreational boat traffic (NRC 1990). Although little is known about a sea turtle's reaction to vessel traffic, it is generally assumed that turtles are more likely to avoid injury from slower-moving vessels since the turtle has more time to maneuver and avoid the vessel. In addition, the risk of ship strike will be influenced by the amount of time the animal remains near the surface of the water. For the proposed action, the greatest risk of vessel collision will occur during transit between shore and the offshore NOMES site. Sea turtles present in these shallow nearshore waters are most likely to be foraging along the bottom. The presence of an experienced endangered species observer who can advise the vessel operator to slow the vessel or maneuver safely when sea turtles are spotted will further reduce to a discountable level the potential for interaction with vessels.

5.4.2 Effects of vessel collisions on whales

Ship strike injuries to whales take two forms: (1) propeller wounds characterized by external gashes or severed tail stocks; and (2) blunt trauma injuries indicated by fractured skulls, jaws, and vertebrae, and massive bruises that sometimes lack external expression (Laist et al. 2001). Collisions with smaller vessels may result in propeller wounds or no apparent injury, depending on the severity of the incident. A majority of whale ship strikes seem to occur over or near the continental shelf, probably reflecting the concentration of vessel traffic and whales in these areas (Laist et al. 2001). As discussed in the Status of the Species section, all whales are potentially subject to collisions with ships. However, due to their critical population status, slow speed, and behavioral characteristics that cause them to remain at the surface, vessel collisions pose the greatest threat to right whales. While there is currently no rule or regulation that implements a requirement for vessel speed, NOAA Fisheries has prepared a draft Ship Strike Reduction Strategy that outlines a number of measures to reduce the threat of ship strikes to right whales. Information included with this strategy suggests that collisions with vessels greater than or equal to 65 feet in length traveling at speeds of less than 14 knots are less likely to result in serious injury and mortality to whales. Vessels typically used for the sampling activities included in this action will be 40-70 feet long, and the ACOE has proposed to limit vessel speed during transit to ten knots or less. Laist et al. (2001) reports that of 41 ship strike accounts that reported vessel speed, no lethal or severe injuries occurred at speeds below ten knots, and no collisions have been reported for vessels traveling less than six knots. In addition, the onboard observer will be able to watch for whales while the vessel is in transit and provide advice on avoiding interactions. When the observer is not required to be present, a bridge watch will be posted and speed reduced to five knots or less if a whale is sighted. Therefore, the risk of vessel strike to right, humpback, and fin whales as a result of the proposed action is discountable.

5.4.3 Synthesis of the effects of vessel collisions on listed species

Although the threat of vessel collision exists anywhere listed species and vessel activity overlap, ship strike is more likely to occur in areas where high vessel traffic coincides with high species density. However, the best available information suggests that right, humpback, and fin whales and sea turtles are not concentrated in the action area. More than 280 commercial fishing boats fish on Stellwagen Bank, and no collisions with marine mammals or sea turtles have been reported. It is possible that collisions are occurring without being detected or reported, but the lack of reported incidents may also be a reflection of the slower operating speed and smaller size of commercial fishing boats relative to recreational vessels and car/passenger ferries. The vessel to be used for the proposed action is moderately sized (40-70 feet), and during the sampling activities, it will only be moving at 2.5 knots, which is unlikely to pose a threat to marine mammals or sea turtles. Although the vessel can move much faster while in transit to and from the NOMES I site, the ACOE has agreed to limit transit speed to ten knots or less. Also, from June 1-November 1 and on all gillnetting trips, an observer will be present to spot endangered species and provide advice for avoiding collisions. When an observer is not present, a bridge watch will be posted to look for whales, and the vessel will slow to five knots or less if whales are seen. In addition, the vessel activity associated with this project will be very limited in scope. The NOMES I site is only eight miles offshore, and the vessel will only make one roundtrip transit between shore and the site. Transits between sampling tows or sets will be limited to within the 103-acre NOMES site, and will thus be short in duration. Therefore, due to the anticipated low species abundance in the action area, the slow operational speed of the sampling vessel, the presence of an observer, and the limited duration of vessel transits associated with this project, NOAA Fisheries has determined that the vessel activity associated with the proposed action is not likely to adversely affect right, humpback or fin whales or loggerhead, Kemp's ridley, green or leatherback sea turtles in the action area.

5.5 Estimating the Number of Turtles Taken in Bottom Trawl and Gillnet Sampling

For the proposed action, NOAA Fisheries must anticipate the amount of incidental take that is reasonably certain to occur during bottom trawling and gillnetting surveys at the NOMES I site. Although NOAA Fisheries considers sea turtles to be generally present in Massachusetts waters, there has been little to no directed survey effort to assess actual sea turtle density or abundance in the vicinity of the NOMES I site. There were no incidents of sea turtle capture during all NOAA Fisheries observed gillnet trips in the Massachusetts Bay between 2000-2002 (NOAA Fisheries NEFSC, unpublished data; see Figure 1). Nonetheless, dozens of sea turtles strand each fall on Cape Cod beaches (more than a hundred in some years), some of which are likely to have washed in from north of Cape Cod. Given the known potential for bottom trawl and gillnet gear to interact with sea turtles, it is reasonable to conclude that some of the sea turtles present in the action area will be captured as a result of the proposed action.

The NEFSC's annual bottom trawl surveys provide the best available comparison to the current action. Since 1979, the NOAA Fisheries NEFSC has captured 47 turtles incidental to bottom trawl surveys in the spring and fall between Cape Hatteras and the Gulf of Maine, for a long-term average capture rate of 2.1 turtles per year. NEFSC surveys are conducted from a single vessel using 30-minute tows. Trawling takes place continuously for a two month period along the entire range of the survey, a much more extensive level of effort than the 11 days of activity associated with the current action. Although most of the sea turtles captured during NEFSC surveys were captured in the mid-Atlantic during the fall surveys, the CETAP survey data suggest that fall sea turtle density in the mid-Atlantic is likely to be higher than summer sea turtle density in Massachusetts waters (CETAP 1982). Therefore, it is unlikely that the number of turtles captured as a result of the proposed action will equal or exceed the average capture rate observed in the NEFSC trawl surveys (2.1 turtles). The NEFSC surveys cannot provide a similar comparison for gillnet sampling; however, the trawl will be the primary gear type used for the proposed action. If the gillnet is used, it will be deployed in the same location under similar conditions (e.g., water depth, bottom type, species density, etc.), and thus the likelihood of a sea turtle being captured in the gillnet is similar to the likelihood of a turtle being captured in the bottom trawl. Consequently, NOAA Fisheries will base the anticipated level of take on the total level of sampling effort, regardless of gear type.

Therefore, considering the overlap of sea turtle presence with gear that is known to take sea turtles, but also taking into account the limited number of sampling days associated with the proposed action (11 days when sea turtles are present), NOAA Fisheries anticipates that greater than zero, but less than 2.1 turtles will be taken. As such, NOAA Fisheries anticipates that one sea turtle is reasonably likely to be taken as a result of the bottom trawling and gillnet surveys associated with the proposed sampling and monitoring activities at the NOMES I site. Based on their relative abundance in the action area, the turtle taken is likely to be a loggerhead, Kemp's ridley, or leatherback sea turtle. The nature of the take may be lethal or non-lethal; a turtle caught in a bottom trawl is likely to be released unharmed, while a turtle taken in a gillnet is likely to drown. Due to their rarity in the action area, no take of hawksbill or green turtles is anticipated during this project.

Loggerhead sea turtles. To assess the impact of the anticipated level of take on the loggerhead population, NOAA Fisheries will use the worst-case scenario to provide a conservative conclusion. As discussed in the Environmental Baseline section, for long-lived species that delay maturity to allow individuals to grow larger and produce more offspring, population growth is highly sensitive to changes in annual survival of the juvenile and adult stages. In addition, the impact of the take will be influenced by the subpopulation from which the turtle taken originated. As the northern subpopulation is possibly the most vulnerable, NOAA Fisheries will conduct this analysis under the assumption that the turtle taken will be a juvenile or adult from the northern subpopulation to provide a conservative conclusion regarding the effect of the take on the loggerhead population as a whole.

NOAA Fisheries anticipates that one loggerhead is reasonably likely to be captured, injured, or killed during the year-long sampling and monitoring activities at the NOMES I site. Under the worst case scenario, the loggerhead would be captured in the gillnet and would consequently drown. The death of one loggerhead would represent a loss of less than 0.03 percent of the estimated number of nesting females in the northern subpopulation (3,800). It can be argued that any amount of lethal take will reduce the number of loggerhead sea turtles in the action area as compared to the number of loggerheads that would have been present in the absence of the proposed action. Nonetheless, even if the loggerhead turtle was killed and was a juvenile or reproductive female from the northern subpopulation, given the status of the loggerhead subpopulation and the estimated number of females, the loss of one loggerhead is not expected to appreciably reduce the species' likelihood of surviving and recovering in the wild.

Kemp's ridley sea turtles. The biology of Kemp's ridleys also suggests that losses of juvenile turtles can have a magnified effect on the survival of this species. The worst case scenario for this situation would be if a juvenile female Kemp's ridley was killed. However, the death of one Kemp's ridley sea turtle during the sampling and monitoring activities at the NOMES I site would represent a loss of 0.03 percent of the population (3,000). Although the death of one Kemp's ridley would reduce the number of Kemp's ridleys that would have been present in the absence of the proposed action, given the estimated number of females in the population, even if one juvenile female Kemp's ridley were killed during gillnetting, such a loss is not expected to appreciably reduce the likelihood of survival and recovery of the species.

Leatherback sea turtles. Recent information suggests that Western Atlantic populations of leatherback sea turtles declined from 18,800 nesting females in 1996 (Spotila *et al.* 1996) to 15,000 nesting females by 2000 (Spotila, pers. comm.). While the mortality rate of adult female leatherback turtles has increased over the past ten years, decreasing the potential number of nesting females, the number of leatherback sea turtle nests in Florida and the U.S. Caribbean has been increasing at about 10.3% and 7.5% respectively per year since the early 1980s. In the 1990's the number of nesting females in the Caribbean Islands was estimated at 1,437-1,780 leatherbacks per year (Spotila *et al.* 1996).

NOAA Fisheries anticipates that the bottom trawling and gillnetting activities at the NOMES I site may result in the annual take of up to one leatherback sea turtle. As with loggerheads and Kemp's ridleys, the take may be lethal or non-lethal. As described above, it can be argued that any amount of lethal take will reduce the numbers of a population. Therefore, the lethal removal of one leatherback sea turtle would be expected to reduce the number of leatherback sea turtles in the action area as compared to the number of leatherback sea turtles that would have been present in the absence of the proposed action. The status of leatherback sea turtles range-wide is of concern. The Pacific population of leatherback turtles has declined precipitously and is of grave concern. Leatherback survivability is affected by numerous natural and anthropogenic factors, including the effects of fisheries as described in the *Environmental Baseline*. Although the extent of impacts to this species is of concern, given that the number of leatherback sea turtle nests in Florida and the U.S. Caribbean has been increasing and the population numbers in the thousands (based on the number of nesting females) the loss of one leatherback sea turtle from the Atlantic population as a result of the proposed action is not expected to appreciably reduce the species' likelihood of surviving and recovering in the wild.

In summary, this biological opinion considered the effects on listed species of bottom trawl and gillnet sampling at the NOMES I site under the proposed sampling and monitoring protocol. The primary concern for sea turtles is capture and entanglement in the bottom trawls and gillnets, while the primary concern for endangered whales is entanglement in gillnets only.

There has been very little directed survey effort to assess the presence of sea turtles in the vicinity of the NOMES I site. However, sea turtles enter northeast waters during the summer months to forage and are known to strand on Cape Cod beaches. NOAA Fisheries thus considers that sea turtles are present in the action area, which is just north of Cape Cod Bay, between June 1 and November 1. Bottom trawls and gillnets are known to interact with sea turtles in several northeast fisheries. Therefore, NOAA Fisheries has determined that bottom trawling and gillnetting at the NOMES I site may adversely affect sea turtles in the action area.

NOAA Fisheries assessed the project's impacts on listed species and the anticipated level of incidental take for the year-long sampling and monitoring activities. Based on the level of sampling effort and the amount of incidental take observed in NEFSC bottom trawl surveys, NOAA Fisheries anticipates that one loggerhead, Kemp's ridley, or leatherback turtle is likely to be taken during bottom trawling and gillnetting at the NOMES I site. Due to the short tow times associated with the bottom trawling and the presence of an observer who is trained in expedited and proper sea turtle handling techniques, any turtle captured is likely to be released unharmed. However, mortality is possible during gillnetting if a turtle becomes entangled in the net unobserved and drowns. Therefore, the nature of the take may be lethal or non-lethal, depending on the gear-type being used in a particular month.

Right, humpback, and fin whales may be affected by the gillnetting portion of these sampling and monitoring activities. However, the available data indicate that sightings of large whales are rare in the NOMES I site. Gillnetting will also take place only between October and February, the period during which right, humpback, and fin whale abundance in the action area is typically lowest. Nonetheless, the ACOE/DUPR will consult the SAS prior to any gillnetting activity, and will delay activities if right whales have been sighted in the vicinity of the NOMES I site. The presence of an observer and the practice of hauling the nets if whales are spotted further reduces the likelihood that a whale will encounter the nets. In addition, implementation of ALWTRP measures minimizes the potential for an undetected whale to become entangled should it encounter the net. As such, NOAA Fisheries concludes that the likelihood of a right, humpback or fin whale becoming entangled, injured, or killed as a result of the gillnetting associated with this action is discountable, and thus the proposed sampling and monitoring protocol is not likely to adversely affect endangered and threatened whales.

Whales and sea turtles may also be affected by the vessel activity associated with this action, given the potential for vessels to collide with these species. While collisions are considered unlikely due to the low species density and limited vessel activity, the presence of an observer and a reduction in the speed at which the vessels will be traveling will reduce the possibility of adverse effects from these interactions to a discountable level.

6.0 CUMULATIVE EFFECTS

Cumulative effects, as defined in the ESA, are those effects of future state or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Sources of human-induced mortality or harassment of cetaceans or turtles in the action area include incidental takes in state-regulated fishing activities, vessel collisions, ingestion of plastic debris, and pollution. The combination of these activities may affect populations of ESA-listed species, preventing or slowing a species' recovery.

Future commercial fishing activities in state waters may take several protected species. However, it is not clear to what extent these future activities would affect listed species differently than the current state fishery activities described in the Environmental Baseline section. The Atlantic Coastal Cooperative Statistics Program (ACCSP) and the NOAA Fisheries sea turtle/fishery strategy, when implemented, are expected to provide information on takes of protected species in state fisheries and systematically collected fishing effort data which will be useful in monitoring impacts of the fisheries. NOAA Fisheries expects these state water fisheries to continue in the future, and as such, the potential for interactions with listed species will also continue.

As noted in the Environmental Baseline section, private vessel activities in the action area may adversely affect listed species in a number of ways, including entanglement, boat strike, or harassment. Boston, Massachusetts is one of the Atlantic seaboard's busiest ports. In 1999, 1,431 commercial ships used the port of Boston (Container vessels-304, Auto-84, Bulk Cargo-972). The major shipping lane to Boston traverses the Stellwagen Bank National Marine Sanctuary, a major feeding and nursery area for several species of baleen whales. Vessels using the Cape Cod Canal, a major conduit for shipping along the New England Coast pass through Massachusetts and Cape Cod Bays. In a 1994 survey, 4093 commercial ships (> 20 meters in length) passed through the Cape Cod Canal, with an average of 11 commercial vessels crossing per day (Wiley *et al.* 1995). In addition to commercial boat traffic, recreational boat traffic is likely to persist at the current level or increase in the Massachusetts and Cape Cod Bays. Recent whale strikes resulting from interaction with whale watch boats and recreational vessels have been recorded (Pat Gerrior, pers. comm.). In New England, there are approximately 44 whale watching companies, operating 50-60 boats, with the majority of effort during May through September. The average whale watching boat is 85 feet, but size ranges from 50 to 150 feet. In addition, over 500 fishing vessels and over 11,000 pleasure craft frequent Massachusetts and Cape Cod Bays (Wiley *et al.* 1995). Various initiatives have also been planned or undertaken to expand or establish high-speed watercraft service in the northwest Atlantic. In the action area for this project, a high-speed ferry (40 mph) operates between Boston and Provincetown, Massachusetts, cutting across Stellwagen Bank. It appears likely that these types of private activities will continue to affect listed species if actions are not taken to minimize the impacts, although it is not possible to predict to what degree these activities will be detrimental to the species.

Increasing vessel traffic in the action area also raises concerns about the potential effects of noise pollution on marine mammals and sea turtles. The effects of increased noise levels are not yet completely understood, although they can range from minor behavioral disturbance to injury and even death. Acoustic impacts can include auditory trauma, temporary or permanent loss of hearing sensitivity, habitat exclusion, habituation, and disruption of other normal behavior patterns such as feeding, migration, and communication. NOAA Fisheries is working to develop policy guidelines for monitoring and managing acoustic impacts on marine mammals from anthropogenic sound sources in the marine environment.

Marine debris (e.g., discarded fishing line, lines from boats, plastics) can entangle turtles in the water and drown them. Turtles commonly ingest plastic or mistake debris for food, as observed with the leatherback sea turtle. The leatherback's preferred diet includes jellyfish, but similar looking plastic bags are often found in the turtle's stomach contents (Magnuson et al. 1990). It is anticipated that marine debris will continue to impact listed species in the action area.

Nutrient loading from land-based sources such as coastal community discharges is known to stimulate plankton blooms in closed or semi-closed estuarine systems. The effect to larger embayments is unknown. Pollutant loads are usually lower in baleen whales than in toothed whales and dolphins. However, a number of organochlorine pesticides were found in the blubber of North Atlantic right whales with PCB's and DDT found in the highest concentrations (Woodley et al. 1991). Contaminants could indirectly degrade habitat if pollution and other factors reduce the food available to marine animals. Turtles are relatively hardy species and are not easily affected by changes in water quality or increased suspension of sediments in the water column. However, if these changes persist, they can cause habitat degradation or destruction, eventually leading to foraging difficulties, which may in turn lead to long term avoidance or complete abandonment of the polluted area by the affected species (Ruben and Morreale 1999).

7.0 INTEGRATION AND SYNTHESIS OF EFFECTS

NOAA Fisheries has determined that the sampling and monitoring activities at the NOMES I site may affect loggerhead, leatherback, green, Kemp's ridley, and hawksbill sea turtles by either removing and altering the availability of the prey resources they utilize or capturing or entangling them in bottom trawls or gillnets. NOAA Fisheries has further determined that the gillnetting portion of the sampling protocol may also affect right, humpback, and fin whales through entanglement in the nets. Both sea turtles and whales may also be affected by collisions with the sampling vessel.

Based on the known interactions between turtles and bottom trawls and gillnets and available information on the distribution of sea turtles in the Massachusetts Bay, NOAA Fisheries has anticipated that one loggerhead, Kemp's ridley, or leatherback turtle is reasonably certain to be taken during the sampling and monitoring activities at the NOMES I site. The nature of the take could be lethal or non-lethal. Although green turtles have been recorded in Massachusetts waters, they are not present in sufficient numbers to indicate a reasonable likelihood of being captured in the trawl or gillnet gear. Hawksbills are not likely to be adversely affected due to the extremely rare presence of this species in the action area.

While precautionary measures should be implemented to minimize the take of sea turtles to the extent possible, the loss of one loggerhead, Kemp's ridley, or leatherback sea turtle would represent a small percentage of these populations. This estimation of the effect of the take on the population is conservative since the best available population estimates are based on the number of nesting females only, and are thus an underestimate of the actual population size. Under the worst case scenario, even if the turtle taken was a juvenile female, NOAA Fisheries does not anticipate this loss will appreciably reduce the likelihood of survival and recovery of loggerhead, Kemp's ridley, or leatherback sea turtles.

Bottom trawls are not known to interact with large whales; however, whales can and do become entangled in gillnets. Due to the limited abundance of large whales in the vicinity of the NOMES I site, the lack of any previous interactions between large whales and gillnets during observed trips in the Massachusetts Bay, the presence of the sampling vessel on site during gillnetting activities, compliance with ALWTRP regulations, the presence of an observer, and the practice of hauling all nets when whales are spotted in the vicinity of the activity, the risk of injury or entanglement to right, humpback, and fin whales is discountable; therefore, right, humpback, and fin whales are not likely to be adversely affected by the proposed gillnetting protocol.

The physical disturbance of sediments and associated epifauna from the NOMES I site could reduce the availability of prey in the trawled areas, but these reductions will be localized and temporary, and foraging turtles and whales are not likely to be limited by the reductions. The potential for the sampling vessel to collide with a listed whale or sea turtle will be discountable due to the limited vessel activity, presence of an observer, compliance with applicable approach regulations, and operation of the vessel at speeds of less than ten knots during transit.

8.0 CONCLUSION

After reviewing the best available information on the status of endangered and threatened species under NOAA Fisheries jurisdiction, the environmental baseline for the action area, the effects of the action, and the cumulative effects in the action area, it is NOAA Fisheries' biological opinion that the sampling and monitoring activities at the NOMES I site may adversely affect but are not likely to jeopardize the continued existence of the loggerhead, leatherback, Kemp's ridley, or green sea turtle. Further, NOAA Fisheries has determined that the hawksbill sea turtle and the right, humpback, and fin whale are not likely to be adversely affected by the proposed action. Because no critical habitat is designated in the action area, none will be affected by the project.

9.0 INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NOAA Fisheries to include any act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation that actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns including breeding, spawning, rearing, migrating, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the ACOE so that they become binding conditions for the exemption in section 7(o)(2) to apply. The ACOE has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the ACOE (1) fails to assume and implement the terms and conditions or (2) fails to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the ACOE must report the progress of the action and its impact on the species to the NOAA Fisheries as specified in the Incidental Take Statement [50 CFR 402.14(i)(3)].

Amount or extent of take
During the year-long sampling and monitoring studies at the NOMES I site, NOAA Fisheries anticipates that one loggerhead, Kemp's ridley, or leatherback sea turtle is reasonably likely to be taken, either lethally or non-lethally. No incidental take for green or hawksbill sea turtles is anticipated as these species are not likely to be present in the action area. While it is difficult to estimate future take of sea turtles, NOAA Fisheries based the anticipated take level on the known interaction between sea turtles and bottom trawls and gillnets, the proposed mitigation measures, the level of incidental take observed in NEFSC bottom trawl surveys, and available information on the presence of sea turtles in the action area.

No incidental take of any listed marine mammal is anticipated for this project.

Effect of the take
In the accompanying BO, NOAA Fisheries evaluated the effects of this level of anticipated take on the above listed species. NOAA Fisheries has determined that these interactions are not likely to jeopardize the continued existence of these species, or destroy or adversely modify critical habitat.

Reasonable and Prudent Measures
NOAA Fisheries has determined that the following reasonable and prudent measures are necessary and appropriate to minimize impacts of incidental take of sea turtles. Although no takes of other listed species are authorized at this time, these measures must be undertaken in a manner which ensures detection of takes of these other species so that appropriate reinitiation action can be taken.

1. The ACOE shall ensure that vessels are operated and sampling is conducted in such a manner that minimizes risk to endangered/threatened species.

2. The ACOE shall ensure that vessels are equipped and sampling is conducted in such a manner that provides endangered/threatened species observers with a reasonable opportunity for detecting interactions with listed species and that provides for handling, collection, and resuscitation of turtles captured or injured during project activity. Full cooperation with the endangered/threatened species observer program is essential for compliance with the ITS.

3. The ACOE shall develop and follow a system to provide timely reporting to NOAA Fisheries on any takes of protected species.

Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the ESA, the ACOE must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. The ACOE has proposed to have an observer present during sampling activities. However, the presence of a trained observer who meets standards established and approved by NOAA Fisheries further increases the chance of spotting endangered species and thus minimizes the potential for interactions. Therefore, for any bottom trawl sampling that occurs during the period of June 1 through November 1, and for any gillnet sampling that occurs during any month, trained NOAA Fisheries-approved endangered species observers must be on board the sampling vessel, in accordance with the attached "Observer Protocol" and "Observer Requirements" (Appendix C).

2. For any incidental take that occurs, an Incident Report of Sea Turtle Take must be completed and the specimen must be photographed (Appendix G).

3. The ACOE has proposed to handle any sea turtle captured using appropriate resuscitation techniques. However, handling procedures were not defined within the action. As such, any sea turtle captured must be handled in accordance with the guidelines outlined in Appendices D and E in order to minimize stress and ensure their safety and viability.

4. A final report summarizing any interactions with listed species must be submitted to NOAA Fisheries (at the addresses specified in Appendix C) within 30 working days of completion of the project.

NOAA Fisheries anticipates that no more than one loggerhead, Kemp's ridley, or leatherback sea turtle will be incidentally taken during the year-long sampling and monitoring activities at the NOMES I site. The reasonable and prudent measures, with their implementing terms and conditions, are designed to monitor and minimize the impact of the incidental take that is expected from the proposed action. If, during the course of the project, this level of incidental take is exceeded, the additional level of take would represent new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided above.

10.0 CONSERVATION RECOMMENDATIONS

In addition to section 7(a)(2), which requires agencies to ensure that proposed projects will not jeopardize the continued existence of listed species, section 7(a)(1) of the ESA places a responsibility on all federal agencies to "utilize their authorities in furtherance of the purposes of this Act by carrying out programs for the conservation of endangered species". Conservation Recommendations are discretionary activities designed to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. The ACOE should support research directed specifically toward assessing endangered species concerns at the proposed dredge site. Such research could include aerial surveys or other techniques that maximize detection of sea turtles and whales.

2. NOAA Fisheries recommends that any sea turtle captured during trawling or gillnetting be sampled for genetic analysis by a NOAA Fisheries laboratory. Any genetic samples from live sea turtles must be taken by trained and permitted personnel. Copies of NOAA Fisheries genetic sampling protocols for live and dead turtles are attached as Appendix H.

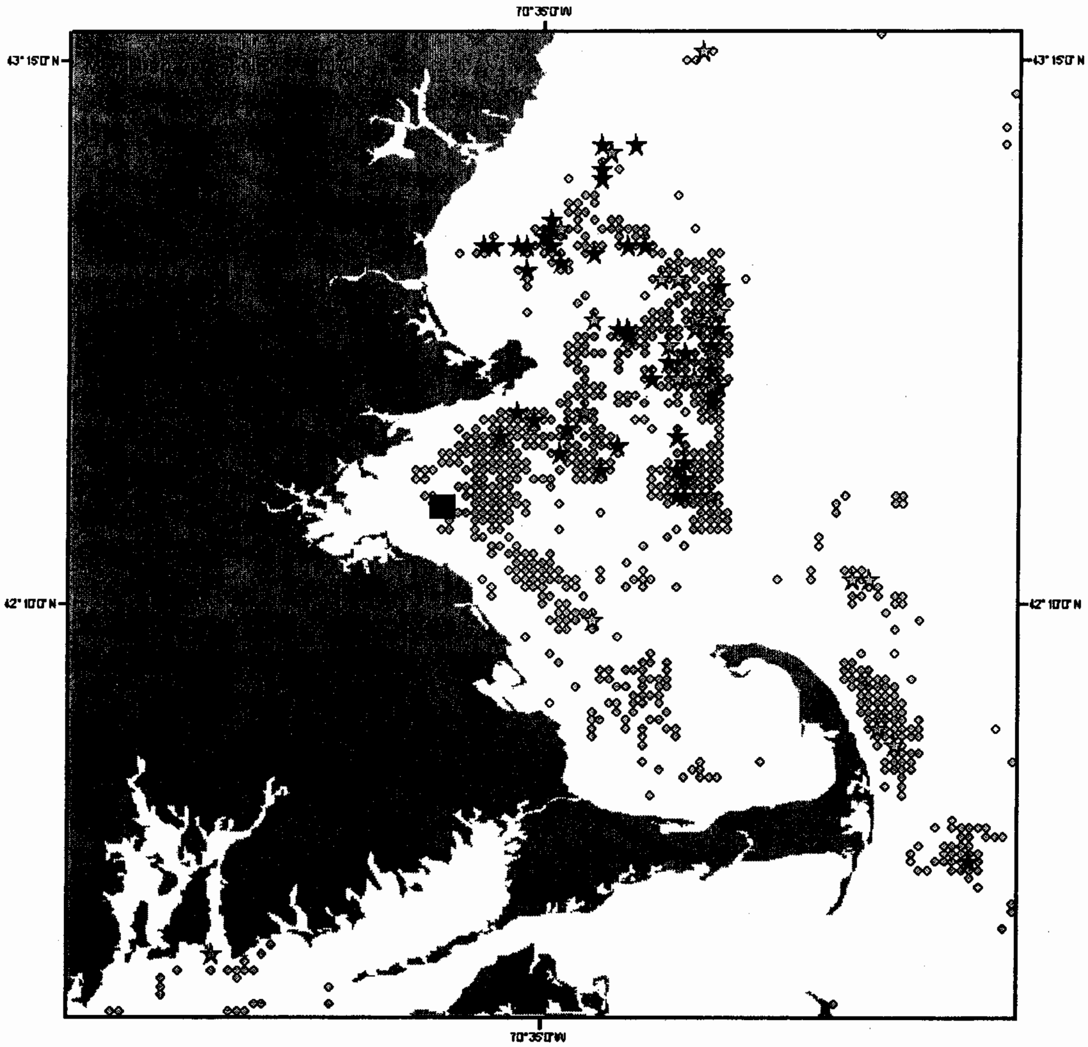
3. The ACOE should report to NOAA Fisheries any data gathered during the surveys that may help determine the suitability of the sampling site as habitat for endangered and threatened species, or the baseline environmental impacts that could affect species in the area. This should include information such as biological resources (e.g., prey species), the level of fishing activity in the area, and the presence of fishing gear at the site.

4. To facilitate future management decisions on listed species occurring in the action area, the ACOE should maintain a database mapping system to: 1) create a history of use of the geographic areas affected; and, 2) document endangered/threatened species presence/interactions with project operations.

11.0 REINITIATION OF CONSULTATION

This concludes formal consultation on the issuance of a permit for biological sampling and monitoring activities at the NOMES I site offshore of Winthrop, MA. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) a new species is listed or critical habitat designated that may be affected by the action; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) new information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered. If the amount or extent of incidental take is exceeded, the ACOE must immediately request reinitiation of formal consultation.

FIGURE 1



Observed Gillnet Trips and Protected Species Bycatch in Massachusetts Bay Region 2000-2002

★ White Sided Dolphin
★ Harp Seals
✯ UnIdentified Seal Species
☆ Harbor Porpoise
★ Harbor Seals
■ NOMES I Dredge Site
• Observed Gillnet Trips 2000-2002

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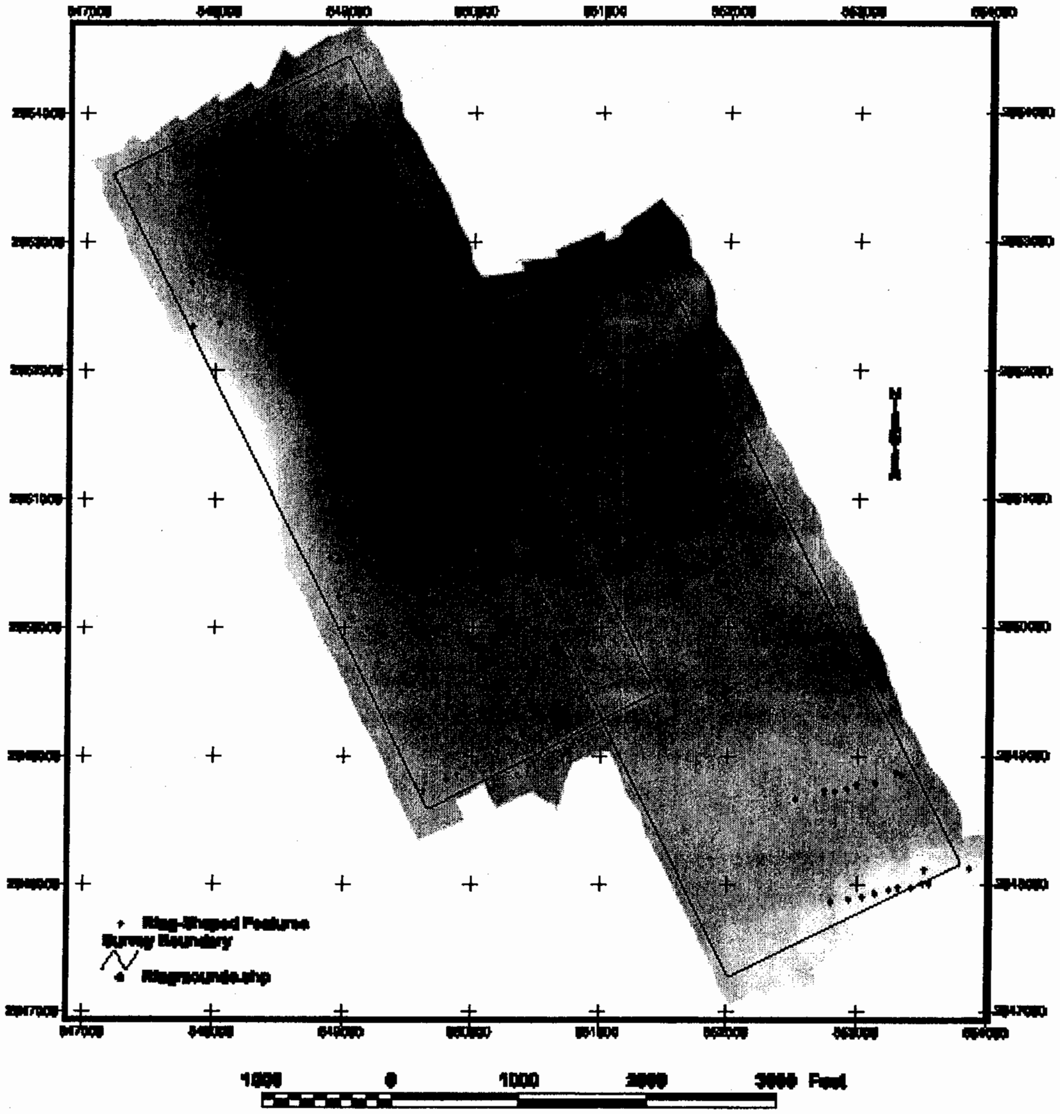
APPENDIX A

Map of Project Location – NOMES I Site, Winthrop, MA

Map: Parsons Brinckerhoff

APPENDIX B
Map of NOMES I site and adjacent reference site



Notes:

1. Grid: Massachusetts State Plane, NAD 83, U.S. Foot.
2. This analysis is considered preliminary.

APPENDIX C.
MONITORING SPECIFICATIONS FOR SAMPLING VESSELS

I. OBSERVER PROTOCOL

A. Basic Requirement

Beginning June 1, a NOAA Fisheries-approved observer with demonstrated ability to identify sea turtle and whale species must be placed aboard the sampling vessel during all bottom trawl and gillnet surveys until project completion or November 1, whichever comes first. In addition, a NOAA Fisheries approved observer with demonstrated ability to identify whale species must be aboard the sampling vessel during any gillnet survey in any month.

B. Duty Cycle

While onboard, observers shall provide the required coverage on a rotating basis so that combined monitoring periods represent 100% of trawl and gillnet sampling periods.

C. Observer Responsibilities

- During the required observer coverage, the trained NOAA Fisheries-approved observer shall inspect the nets at the completion of each trawl tow or gillnet set for evidence of sea turtles.
- During vessel transit (i.e. when sampling is not taking place), the observer shall continue to watch for listed species. If a whale or sea turtle is spotted, the observer shall immediately inform the vessel operator and provide advice to avoid interaction with the species.
- The Endangered Species Observation Form shall be completed for each tow or set, whether listed species are observed or not (Appendix F).
- If any sea turtles are taken incidental to the project, Kristen Koyama (978) 281-9328 ext. 6531 or Pat Scida (978) 281-9208 must be contacted within 24 hours of when the take was documented.
- An Incident Report of Sea Turtle Take (Appendix G) shall be completed by the observer and sent to Kristen Koyama via FAX (978) 281-9394 within 24 hours of when the take was documented. Incident reports shall be completed for any take, even if the turtle is released uninjured.
- Every incidental take should be photographed, and photographs shall be sent to NOAA Fisheries either electronically (Kristen.Koyama@noaa.gov) or through the mail within 24 hours of when the take was documented.
- Upon conclusion of the project, a final report, including all completed Endangered Species Observation Forms, photographs, and relevant incident reports, shall be submitted to NOAA Fisheries NER, Protected Resources Division, One Blackburn Drive, Gloucester, MA 01930-2298.

D. Information to be Collected

For each sighting of any endangered or threatened marine species (including whales as well as sea turtles), record the following information on the Endangered Species Observation Form (Appendix F):

1) Date, time, coordinates of vessel
2) Visibility, weather, sea state
3) Vector of sighting (distance, bearing)
4) Duration of sighting
5) Species and number of animals
6) Observed behaviors (feeding, diving, breaching, etc.)
7) Description of interaction with the operation

E. Disposition of Parts

After a photograph has been taken and the Incident Report of Sea Turtle Take has been completed as described in section I-C above, sea turtles must be disposed of or released in the following manner:

- Disposition of **dead sea turtles** will be determined by NOAA Fisheries at the time of the take notification. NOAA Fisheries may request one of the following:
  - The turtle shall be placed in a plastic bag, labeled with location, date, and time taken, and placed in cold storage. Specimens will be collected by NOAA Fisheries or NOAA Fisheries-approved personnel (contact Kristen Koyama at (978) 281-9328 ext. 6531).
  - The dead turtle should be disposed of by attaching a weight to the animal and dumping the specimen away from the sampling sites. If possible, a mark or tag (e.g., Inconel tag) should be placed on the carcass in the event that the animal is recaptured or stranded.
- **Live, uninjured[1] turtles** should be released away from the sampling site in accordance with the Sea Turtle Relocation Guidelines in Appendix E.
- **Live, injured[1] turtles** should be held onboard the vessel in accordance with the Sea Turtle Handling and Resuscitation Guidelines (Appendix D) and transported as soon as possible to the appropriate stranding network personnel for rehabilitation (see Appendix D for contacts).
- Dana Hartley (NOAA Fisheries Stranding Network Coordinator: (508) 495-2090; pager: (978) 585-7149) should also be contacted immediately upon any **marine mammal injury or mortality** incidents. **Entangled marine mammals** should be reported immediately to the Center for Coastal Studies entanglement hotline at (800) 900-3622.

II. OBSERVER REQUIREMENTS

Submission of resumes of endangered species observer candidates to NOAA Fisheries for final approval ensures that the observers placed onboard the vessels are qualified to document takes of endangered and threatened species, to confirm that incidental take levels are not exceeded, and to

[1] The NOAA Fisheries-approved observer must evaluate the animal for injuries. If there is any doubt as to the animal's condition, the animal should be treated as injured.

provide expert advice on ways to avoid impacting endangered and threatened species. NOAA Fisheries does not offer certificates of approval for observers, but approves observers on a case-by-case basis.

A. Qualifications

Observers must be able to:

1) differentiate between leatherback (*Dermochelys coriacea*), loggerhead *Caretta caretta*), Kemp's ridley *(Lepidochelys kempii*), green (*Chelonia mydas*), and hawksbill *(Eretmochelys imbricata*) turtles;

2) handle live sea turtles and resuscitate and release them according accepted procedures;

3) correctly measure the carapace and plastron length and width of live and whole dead sea turtle species;

4) identify marine mammal species and behaviors.

B. Training

Ideally, the applicant will have educational background in marine biology, general experience aboard fishing vessels, and hands-on field experience with the species of concern. For observer candidates who do not have sufficient experience or educational background to gain immediate approval as endangered species observers, the following observer training is necessary to be considered admissible by NOAA Fisheries. We can assist the ACOE by identifying groups or individuals capable of providing acceptable observer training. Therefore, at a minimum, observer training must include:

1) instruction on how to identify sea turtles and their parts;

2) demonstration of the proper handling of live sea turtles incidentally captured during project operations. Observers may be required to resuscitate sea turtles according to accepted procedures prior to release;

3) instruction on standardized measurement methods for sea turtle lengths and widths; and

4) instruction on how to identify marine mammals.

APPENDIX D
Sea Turtle Handling and Resuscitation

These guidelines are adapted from 50 CFR §223.206(d)(1).

Please photograph all turtles (alive or dead) captured during sampling activities and complete the Incident Report of Sea Turtle Take (Appendix G).

<u>Dead sea turtles</u>
The procedures for handling dead sea turtles are described in Appendix C-I-E.

<u>Live sea turtles</u>
When a sea turtle is found in the sampling gear, observe it for activity and potential injuries.

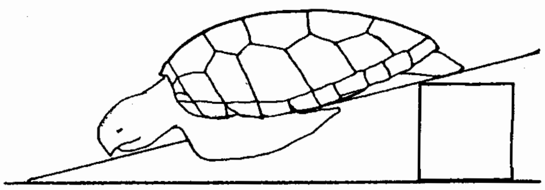
- **If the turtle appears to be uninjured**, it should be removed from the sampling site and released into the water according to the Sea Turtle Relocation Guidelines in Appendix E.

- **If the turtle appears to be injured**, it should be retained onboard until evaluated for injuries by a permitted rehabilitation facility. The live turtle should be transported to the nearest rehabilitation facility as soon as possible, following these steps:
  1) Contact the nearest rehabilitation facility to inform them of the incident. If the rehabilitation personnel cannot be reached immediately, please contact Kristen Koyama at (978) 281-9328 ext. 6531, or Carrie Upite at (978) 281-9328 ext. 6525.
  2) Keep the turtle shaded and moist (e.g., with a water-soaked towel over the eyes, carapace, and flippers), and in a confined location free from potential injury.
  3) Transport the live turtle to the closest permitted rehabilitation facility able to handle such a case.

  Do not assume that an inactive turtle is dead. The onset of rigor mortis and/or rotting flesh are often the only definite indications that a turtle is dead. Releasing a comatose turtle into any amount of water will drown it, and a turtle may recover once its lungs have had a chance to drain.

- **If a turtle appears to be comatose** (unconscious), contact the designated stranding/rehabilitation personnel immediately. Once the rehabilitation personnel has been informed of the incident, attempts should be made to revive the turtle at once. Sea turtles have been known to revive up to 24 hours after resuscitation procedures have been followed.
  - Place the animal on its bottom shell (plastron) so that the turtle is right side up and elevate the hindquarters at least 6 inches for a period of 4 up to 24 hours. The degree of elevation depends on the size of the turtle; greater elevations are required for larger turtles.

- Periodically, rock the turtle gently left to right and right to left by holding the outer edge of the shell (carapace) and lifting one side about 3 inches then alternate to the other side.
- Periodically, <u>gently</u> touch the eye and pinch the tail (reflex test) to see if there is a response.
- Keep the turtle in a safe, contained place, shaded and moist (e.g., with a water-soaked towel over the eyes, carapace, and flippers) and observe it for up to 24 hours.
- If the turtle begins actively moving, retain the turtle until the appropriate rehabilitation personnel can evaluate the animal. The rehabilitation facility should eventually release the animal in a manner that minimizes the chances of re-capture and potential harm to the animal (i.e., from cold stunning).
- Turtles that fail to move within several hours (up to 24) must be handled in the manner described in Appendix C-I-E, or transported to a suitable facility for necropsy (if the condition of the sea turtle allows and the rehabilitation facility wants to necropsy the animal).



<u>Stranding/rehabilitation contacts</u>

Sea Turtles in Massachusetts

- Robert Prescott, Massachusetts Audubon Society, Wellfleet Bay Wildlife Sanctuary
  Phone: (508) 349-2615
- Connie Merigo, New England Aquarium
  Phone: (617) 973-6551
- NOAA Fisheries Stranding Network pager (24 hrs.): (978) 585-7149

Marine Mammals

- Connie Merigo, New England Aquarium: (617) 973-6551
- Cape Cod Stranding Network: (508) 743-9548
- Dana Hartley (NOAA Fisheries Stranding Network Coordinator: (508) 495-2090; pager: (978) 585-7149)
- Center for Coastal Studies Entanglement Hotline: (800) 900-3622

APPENDIX E
Sea Turtle Relocation Guidelines

If a sea turtle is captured during sampling activities and a NOAA Fisheries-approved observer determines that it is uninjured, the turtle should be returned to the water according to the following procedures:

1. Sea turtles captured pursuant to trawling or gillnetting shall be handled in a manner designed to ensure their safety and viability, and shall be released over the side of the vessel, away from the propeller, and only after ensuring that the vessel's propeller is in the neutral, or disengaged, position (i.e., not rotating). Captured turtles shall be kept moist, and shaded whenever possible, until they are released. Resuscitation guidelines can be found at 50 CFR 223.206(d)(1) and are included in part in Appendix D.

2. Any turtles captured during the survey shall be measured in accordance with standard biological sampling procedures prior to release, and weighed when possible. If the NOAA Fisheries-approved observer onboard is operating under a valid Section 10 permit, captured sea turtles shall be tagged prior to release with external flipper tags, which shall be obtained prior to the project from the University of Florida's Archie Carr Center for Sea Turtle Research. Sampling data and any external tags shall be recorded on the Incident Report of Sea Turtle Take (Appendix G).

3. Turtles shall be kept no longer than 12 hours prior to release and shall be released at least one mile away from the sampling site (if it can be done safely, turtles may be transferred onto another vessel for transport to the release area to enable the trawler or gillnetter to continue sampling).

4. External or internal sampling procedures (e.g., flipper tagging, PIT tagging, blood letting, skin tag sampling, laparoscopies, gastric lavages, mounting satellite or radio transmitters, genetics sampling, etc.) performed on live sea turtles are not permitted under this BO unless the observer holds a valid sea turtle research permit authorizing sampling (obtained pursuant to section 10 of the ESA, from the NOAA Fisheries' Office of Protected Resources, Permits Division), either as the permit holder, or as designated agent of the permit holder.

5. This BO serves as the permitting authority for any NOAA Fisheries-approved endangered species observer aboard the sampling vessel to conduct genetic sampling on dead turtles, without the need for a Section 10 permit, if following the genetics sampling protocol in Appendix I.

6. The endangered species observer must document the date, time, and location of release in the Incident Report of Sea Turtle Take (Appendix G).

APPENDIX F
ENDANGERED SPECIES OBSERVER FORM
Bottom Trawling and Gillnetting at NOMES I Site
Winthrop, MA

Daily Report

Date: ______________________________

Geographic Site: ____

Location: Lat/Long ____________________ Vessel Name ___________________________

Weather conditions: ____

____

Water depth: ________ Water temp: Surface ________ Below midwater (if known): __________

Sampling method *(circle one)*: TRAWL GILLNET

Incidents involving endangered or threatened species? (Circle) Yes No
(*If yes, fill out Incident Report of Sea Turtle Take – Appendix H*)

Comments (biological specimens, unusual circumstances, etc):

____

____

____

Observer's Name: ____

Observer's Signature: ____

BRIDGE WATCH SUMMARY

Species	# of Sightings	# of Animals	Comments

APPENDIX G
Incident Report of Sea Turtle Take
Bottom Trawling and Gillnetting at NOMES I Site, Winthrop, MA

Species ____________ Date ______________ Time (specimen found) _______________
Geographic Site ____
Location: Lat/Long ____
Vessel Name ________________________ Tow/Set # ___________________________
Begin tow/set time ____________________ End tow/set time________________________
Weather conditions____
Water depth:_______ Water temp: Surface _______ Below midwater (if known):_________

Sampling method *(circle one)*: TRAWL GILLNET

Species Information: *(please designate cm/m or inches.)*
Head width ________________________ Plastron length _________________________
Straight carapace length ______________ Straight carapace width______________________
Curved carapace length _______________ Curved carapace width ______________________
Plastron width______________________ Weight (kg or lbs)_________________________
Condition of specimen/description of animal (please complete attached diagram)
____
____
____

Turtle tagged: YES NO *Please record all tag numbers.* Tag # _____________
Is this a recapture: YES NO
Genetic sample taken: YES NO
Photograph attached: YES NO
(please label *species, date, geographic site* and *vessel name* on back of photograph)

Turtle Release Information *(if applicable; see Appendix D)*:
Date___________________________ Time___________________________
Lat____________________________ Long___________________________
State___________________________ County_________________________

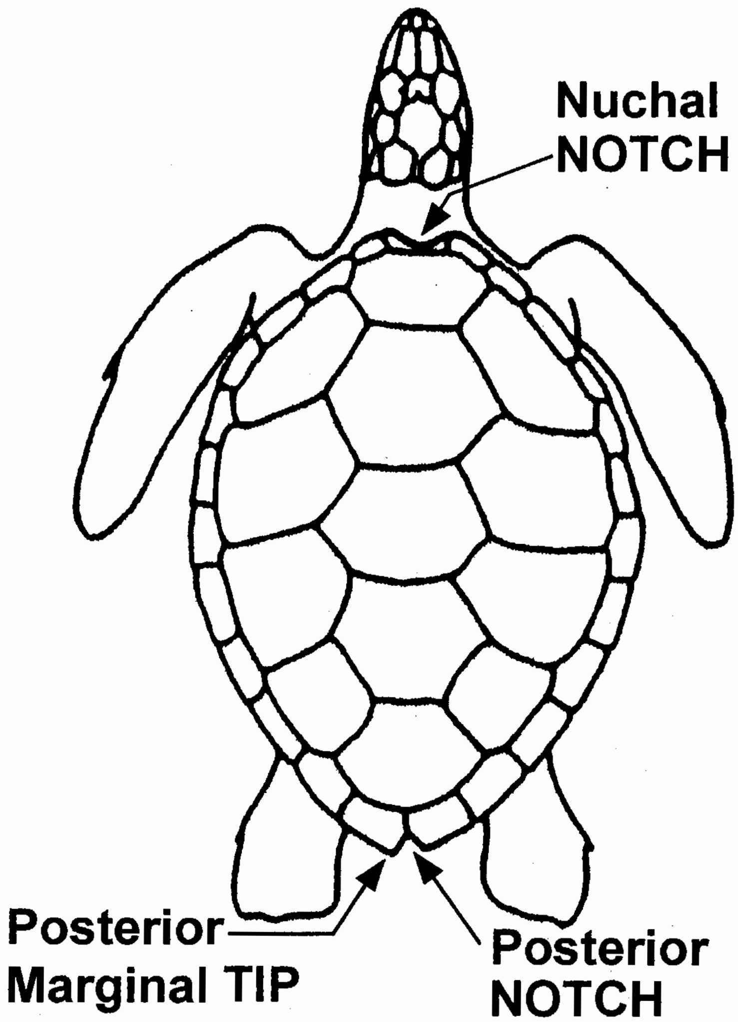
Comments/other (include justification on how species was identified, evidence of gear/debris entanglement, wounds, papillomas, propeller damage, old or new tag locations, etc.)
____
____
____

Observer's Name ____________________________________

Observer's Signature ______________________________

Incident Report of Sea Turtle Take
Bottom Trawling and Gillnetting at NOMES I Site, Winthrop, MA

Draw wounds, abnormalities, tag locations on diagram and briefly describe below.



Description of animal:

APPENDIX H.
Protocol for Collecting Tissue from Sea Turtles for Genetic Analysis

Materials for Collecting Genetic Tissue Samples

- surgical gloves
- alcohol swabs
- betadine swabs
- sterile disposable biopsy punches
- sterile disposable scalpels
- permanent marker to externally label the vials
- scotch tape to protect external labels on the vials
- pencil to write on internal waterproof label
- waterproof label, 1/4" x 4"
- screw-cap vial of saturated NaCl with 20% DMSO*, wrapped in parafilm
- piece of parafilm to wrap the cap of the vial after sample is taken
- vial storage box

* The 20% DMSO buffer within the vials is nontoxic and nonflammable. Handling the buffer without gloves may result in exposure to DMSO. This substance soaks into skin very rapidly and is commonly used to alleviate muscle aches. DMSO will produce a garlic/oyster taste in the mouth along with breath odor. The protocol requires that you wear gloves each time you collect a sample and handle the buffer vials. DO **NOT** store the buffer where it will experience extreme heat. The buffer must be stored at room temperature or cooler, such as in a refrigerator.

Please collect two small pieces of muscle tissue from all live[1], comatose[1], and dead[2] stranded loggerhead, green, leatherback, and hybrid sea turtles (and any hawksbills, although this would be a rare incident). A muscle sample can be obtained no matter what stage of decomposition a carcass is in. Please utilize the equipment in these kits for genetic sampling of **turtles only** and contact Kara Dodge when you need additional biopsy supplies.

Note that genetic samples are not required for the single stock of Kemp's ridleys.

Sampling Protocol for Live or Comatose turtles[1]

1. Stabilize the turtle on its plastron. When turtles are placed on their carapace they tend to flap their flippers aggressively and injuries can happen. Exercise caution around the head and jaws.

2. The biopsy location is the dorsal surface of the rear flipper, 5-10 cm from the posterior (trailing) edge and close to the body. Put on a pair of surgical gloves and wipe this area with a Betadine swab.

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[1] For any sampling activity on live or comatose turtles, the sampler must be operating under a valid ESA Section 10 research permit.

3. Wipe the hard surface (plastic dive slate, biopsy vial cap or other available clean surface) that will be used under the flipper with an alcohol swab and place this surface underneath the Betadine treated flipper.

4. Holding a new (sterile and disposable) plastic skin biopsy punch by the thumb and index finger, gently press the biopsy punch into the flesh, as close to the posterior edge of the rear flipper as possible. Press down with moderate force and rotate the punch one or two complete turns to make a circular cut all the way through the flipper. The biopsy tool has a sharp cutting edge so exercise caution at all times.

5. Repeat the procedure twice (one per rear flipper) with the same biopsy punch so that you now have two samples from this animal.

6. Remove the tissue plugs by knocking them directly from the biopsy punch into a single vial containing 20% DMSO saturated with salt. It is important to ensure that the tissue samples do not come into contact with any other surface or materials during this transfer.

7. Use a pencil to write the stranding ID, date, species ID and SCL on the waterproof label and place it in the vial with the samples.

8. Label the outside of the vial using the permanent marker with stranding ID, date, species ID and SCL .

9. Apply a piece of clear scotch tape over the what you have written on the outside of the vial to protect the label from being erased or smeared.

10. Wrap parafilm around the cap of the vial by stretching as you wrap.

11. Place the vial in the vial storage box.

12. Complete the Sea Turtle Biopsy Sample Collection Log.

13. Attach a copy of the STSSN form to the Collection Log - be sure to indicate on the STSSN form that a genetic sample was taken.

14. Wipe the biopsy area with another Betadine swab.

15. Dispose of the used biopsy punch and gloves. It is very important to use a new biopsy punch for each animal to avoid cross contamination.

Sampling Protocol for Dead Turtles[2]

1. Put on a pair of surgical gloves. The best place to obtain the muscle sample is on the ventral side where the front flippers insert near the plastron. It is not necessary to cut very deeply to get muscle tissue.

2. Using a new (sterile and disposable) scalpel cut out two pieces of muscle of a size that will fit in the vial.

3. Transfer both samples directly from the scalpel to a single vial of 20% DMSO saturated with salt.

4. Use the pencil to write the stranding ID, date, species ID and SCL on the waterproof label and place it in the vial with the samples.

5. Label the outside of the vial using the permanent marker with stranding ID, date, species ID and SCL .

6. Apply a piece of clear scotch tape over the what you have written on the outside of the vial to protect the label from being erased or smeared.

7. Wrap parafilm around the cap of the vial by stretching as you wrap.

8. Place the vial in the vial storage box.

9. Complete the Sea Turtle Biopsy Sample Collection Log.

10. Attach a copy of the STSSN form to the Collection Log - be sure to indicate on the STSSN form that a genetic sample was taken.

11. Dispose of the used scalpel and gloves. It is very important to use a new scalpel for each animal to avoid cross contamination.

At the end of the project cycle, submit all genetic samples to:

Kara Dodge
NOAA Fisheries/NEFSC
166 Water Street
Woods Hole, MA 02543
(508) 495-2274

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[2] NOAA Fisheries-approved endangered species observers are authorized to conduct genetic sampling activities on dead sea turtles without a separate ESA Section 10 permit, provided the observer adheres to the sampling protocol specified below.

APPENDIX I.
Atlantic Large Whale Take Reduction Plan: Measures for Anchored Gillnet Fisheries in Other Northeast Waters

"Other Northeast Gillnet Waters" consists of all US waters west of the US/Canada border and north of a line extending due east from the VA/NC border with the exception of the Cape Cod Bay Critical Habitat Restricted Area, Stellwagen Bank/Jeffreys Ledge Restricted Area, Great South Channel Restricted Gillnet Area, Great South Channel Sliver Restricted Area, Mid-Atlantic Coastal Waters Area and the exempted waters listed in 50 CFR 229.32(a)(2).

Anchored Gillnetting permitted if:

- Gear is marked (4" green mark midway on buoy line)
- Universal Requirements are satisfied
- Area-specific Requirements are satisfied

Universal Requirements:

- No floating buoy line at the surface
- No wet storage of gear
- Fishermen are encouraged, but not required, to maintain knot-free buoy lines

Anchor Gillnet Fishery Area-Specific Gear Requirements:

- All buoys must be attached to the buoy line with a weak link having a breaking strength no greater than 1100 lb (498.8 kg). Weak links may include swivels, plastic weak links, rope of appropriate strength, hog rings, rope stapled to a buoy stick, or devices approved in writing. The weak link must be designed so that the bitter end of the buoy line is clean and free of knots when the weak link breaks.
- All net panels must contain weak links with a breaking strength no greater than 1100 lb (498.8 kg) in the center of the floatline (headrope) of each net panel
- Anchored gillnet strings of 20 or fewer net panels must be secured in 1 of 3 ways:
    1. with the holding power of at least a 22 lb (10.0 kg) Danforth-style anchor at each end of the net string,
    2. with at least 50 lb (22.7 kg) of dead weight at each end of the net string, or
    3. with a lead line weighing at least 100 lb (45.4 kg) per 300 feet for each net panel in the net string.